

AUTOMOTIVE INDUSTRIES

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

OCTOBER 1, 1950

In This Issue . . .

Track Design for Track-Laying Vehicles

Nash Improvements—Details of Henry J

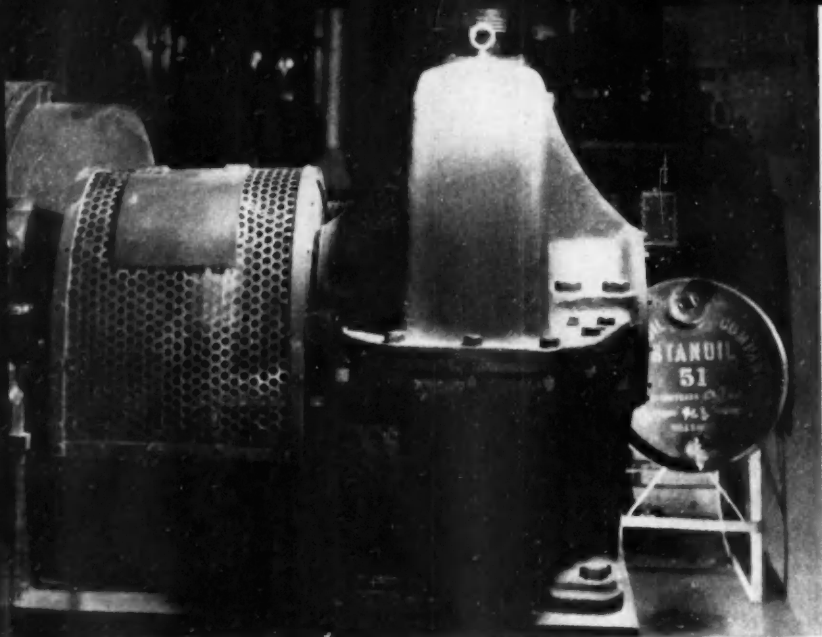
Packard's New Bodies in Production

Aircraft Industry Boom Under Way

Diesel Locomotive Engine Developments

Complete Table of Contents, Page 3

A CHILTON PUBLICATION



Arrest the dirty work in reduction gears

THE dirty work starts in reduction gears when the lubricating oil begins to oxidize and break down under the attack of heat and air. Oxidation products, uniting with dust and other foreign matter, form deposits which interfere with proper lubrication and cause gear wear.

You can head off this dirty work—avoid costly cleaning jobs, oil changes, and gear wear—by using STANOIL Industrial Oil. The high stability of STANOIL prevents deterioration by heat. Its low-carbon-forming base oil keeps gears free from carbon. An inhibitor curbs acidity growth which would cause the formation of emulsions and sludge.

The many qualities of this one oil enable it to handle a wide variety of jobs



in your plant. To assure you maximum benefits from STANOIL and other high-quality petroleum products, the Standard Oil Company has a well-trained and experienced lubrication specialist located practically at your doorstep. How you can profit by this unique product-service combination is explained at the right.

Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

● To help you solve particular lubrication problems or gain greater all-around economy, Standard Oil has set up an industrial service that's unrivalled in the Midwest. This service puts at your immediate disposal the help of a highly trained, experienced lubrication specialist and a reliable supply of petroleum products. All you need do is phone or address a card to the nearest Standard Oil Company (Indiana) office. In fact, why not start right now by arranging for the visit of the lubrication specialist assigned to your plant. With his help, find how many different oils in your plant can be replaced by STANOIL Industrial Oil on such applications as:

Hydraulic systems ... cleaner operation, no foaming troubles.

Air compressors ... no sticking or clogging of valves, less oil consumption in splash or circulating systems.

Speed reducers ... less wear of gears and bearings during frequent cold starts or prolonged high-temperature operation.

Steam turbines ... freedom from emulsions and sludge, fewer oil changes necessary.

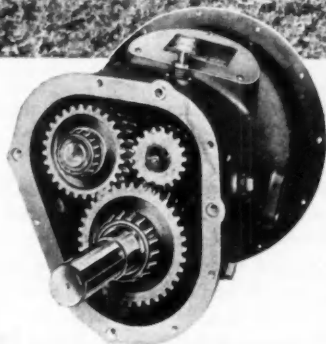
Ring-oiled bearings ... rings function immediately on starting, less bearing wear.

Circulating and bath systems ... one oil for a wide variety of jobs.

STANDARD OIL COMPANY (INDIANA)



Adapts motor speed to rpm required by new field chopper



- Broad range of ratios
- Input torque from 150 to 1350 foot pounds
- For use on cranes, shovels, rock crushers, generators, pumps, etc.

"Field Queen" cuts, chops, and loads alfalfa . . . ready for dehydrating

Self-propulsion at slow operating or faster traveling speeds, plus the driving of the cutting, chopping and loading mechanisms on this remarkable new "Field Queen" is accomplished with *one* motor—with the help of a COTTA Reduction Unit. Now it is possible to cut and chop green alfalfa in the field—load it onto trucks . . . have it dehydrated, ground and sacked in thirty minutes (thus preserving maximum vitamin content). Do you have a speed reduction problem we can help you solve? . . . we're as near as your telephone or your dictaphone!

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem — COTTA engineers will help you select the right unit for best performance. May we work with you?

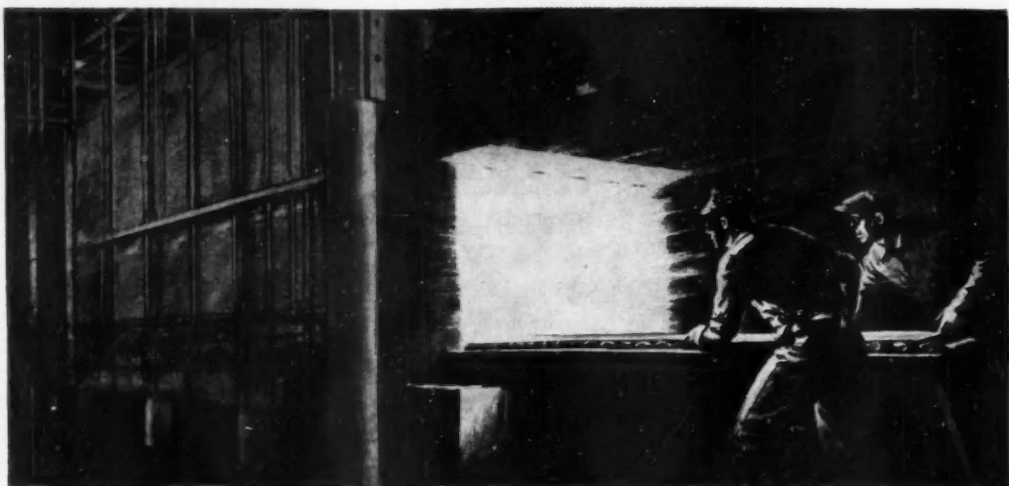
COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS



COTTA

**HEAVY-DUTY
REDUCTION UNITS**

"Engineered-to-order"



Appropriate **NICKEL-CHROMIUM-IRON** Castings Help Solve Furnacing Problems

Utilize the experience of alloy casting producers in selecting the correct alloy type to meet your specific needs.

Nickel-chromium-iron heat resistant castings... made in conformity with the Alloy Casting Institute designations with specified nickel contents ranging up to 68% and chromium up to 32% may be broadly classified as follows:

GROUP I—Very High Nickel—Low Chromium—Highly resistant to oxidation, carburization, nitriding, thermal shock and creep... this group of castings with very

high nickel content provides extra stamina in vital heat treating and furnace applications.

GROUP II—High Nickel—Low Chromium—This group embraces the main furnace alloys. These high nickel—low chromium alloys are used extensively for salt and lead pots, furnace muffles and in highly stressed parts such as chains, link belts and other moving parts.

GROUP III—Low Nickel—High Chromium—Large tonnages of low nickel—high chromium alloys are used in the heat treating and furnace field. These castings are lower in cost than those of the first two groups. They provide somewhat less resistance to carburization and nitriding than do the higher nickel types.

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Our casting specialists will be glad to consult with you and suggest where nickel-chromium-iron alloys may be useful to you. Write us today.



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and CHEMICAL COMPOSITION RANGES for HEAT and COR-
ROSION RESISTANT CASTINGS with SOURCES OF SUPPLY.

Name.....Title.....
Company.....
Address.....
City.....State.....

**THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET
NEW YORK 5, N. Y.**

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

Oct. 1, 1950

Vol. 103, No. 7

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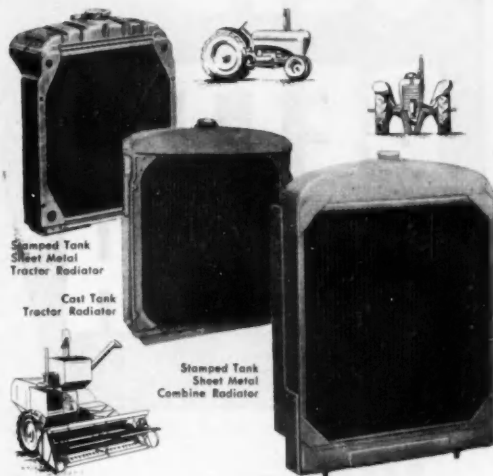
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AUTOMOTIVE INDUSTRIES, October 1, 1950

Farm equipment manufacturers: ARE YOU GETTING THE MOST FOR YOUR RADIATOR DOLLAR?



See the newest Young design features before you decide

There is something new in tractor and implement radiators! Let us show you how Young engineering, modern production machines, and careful attention to details in manufacturing combine to produce radiators that are simpler in design, less costly to make, and more efficient in performance. This, we believe, explains the fact that more and more manufacturers of farm and industrial tractors and self-propelled farm implements are turning to Young for their heat transfer requirements.

Be sure you are getting the best possible radiator value. Send us your requirements, let us show you our product, then compare our proposal. Incidentally, we can offer similar economies, including complete "packaged cooling," in passenger car, truck, bus, aircraft and stationary engine applications.

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HEAT TRANSFER PRODUCTS FOR
AUTOMOTIVE AND INDUSTRIAL
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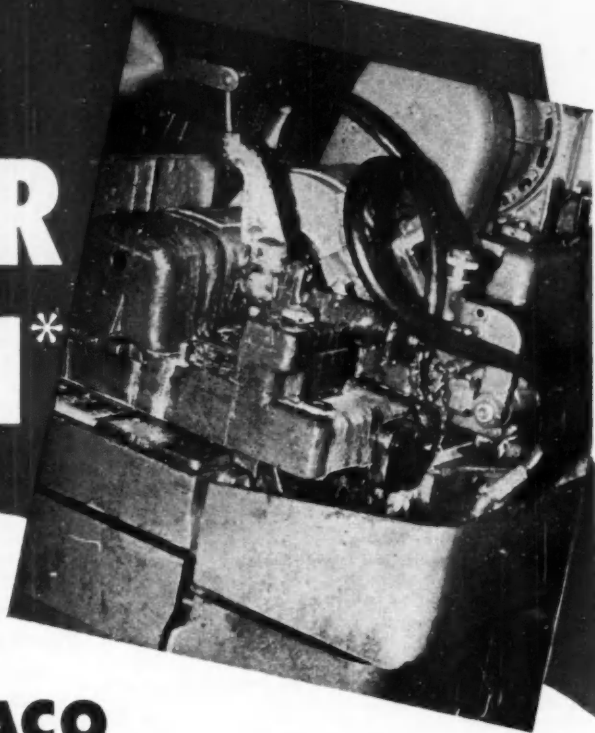
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Plants at Racine, Wisconsin and Mattoon, Illinois

GETS BETTER FINISH*

When grinding with **TEXACO** **SOLUBLE OIL HW**



* Name of this Texaco user on request

The machine operator's reasons for preferring *Texaco Soluble Oil HW* are important. First of all, he says, it doesn't irritate, doesn't make his eyes smart, doesn't have a bad odor. Also, *Texaco Soluble Oil HW* assures a finish that is always uniformly fine, rust-free and smooth.

Texaco Soluble Oil HW is made especially for use in hard water areas. It makes a perfect grinding emulsion—one with high stability that keeps the work cool and prevents distortion from frictional heat. Emulsions made with *Texaco Soluble Oil HW* settle out the grinding dirt quickly, keep wheels from loading, assure greater production at

lower cost.

There is a complete line of *Texaco Cutting, Grinding and Soluble Oils* to help you do all your machining better, faster, more economically. A *Texaco Lubrication Engineer*, specializing in cutting fluids, will gladly help you select the right ones to improve metal working operations in your plant.

Just call the nearest of the more than 2,000 *Texaco Wholesale Distributing Plants* in the 48 States, or write

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

VISIT THE TEXACO EXHIBIT AT THE METALS SHOW • BOOTH 1906 • CHICAGO, OCTOBER 23-27



TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

TUNE IN... TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

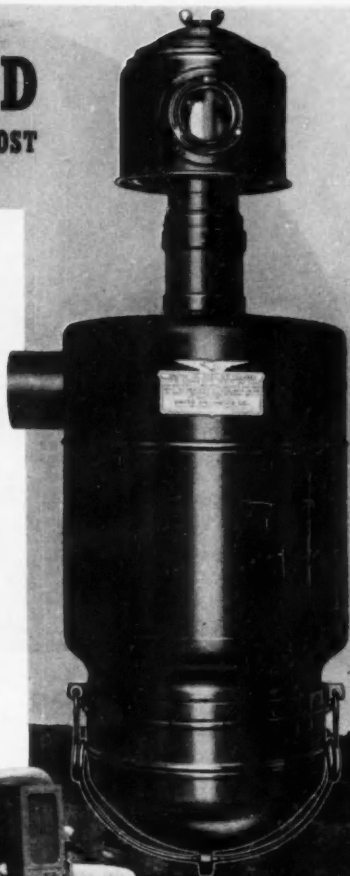
DEPEND ON UNITED

WHERE AIR CLEANER PROTECTION COUNTS MOST

The value of United Oil Bath Air Cleaner protection is nowhere more strikingly demonstrated than on construction equipment.

For example, motor graders used in building and maintaining earth roads are constantly exposed to heavily dust-laden conditions. Equipped with United Air Cleaners that keep harmful abrasives out of the engine, thus protecting pistons, rings and cylinder walls, these busy machines stay out of the repair shop and on the job more. Engines last longer — maintenance and replacement costs are greatly reduced.

Back of United are over 25 years of air cleaner manufacturing. There are 260 different United models, a size and type to fit any kind of internal combustion engine. Our sales engineers will be glad to place this experience at your disposal in discussing your problems.



UNITED SPECIALTIES COMPANY

AIR CLEANERS • METAL STAMPING • DIE CASTING • MACHINE WORK
AUTOMOTIVE DIVISION • CHICAGO, ILL. • U.S.A.

**AIR CLEANERS ★ METAL STAMPING ★ DIE CASTING
★ MACHINING AND TOOL DIES ★ SPECIAL SHAPES**

Pictured here is an Allis-Chalmers Model AD-4 Motor Grader smoothing out a country road. It is equipped with United Oil Bath Air Cleaner CT11-11065.



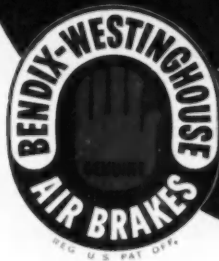
"A USED TRUCK I BOUGHT LAST
YEAR ALREADY HAD BENDIX-
WESTINGHOUSE AIR BRAKES . . .

Savings on that ONE Truck CONVINCED ME!"

Running a small fleet of trucks calls for some mighty close figuring if you are going to realize the maximum profit on every job. That's why old hands in the trucking business install Bendix-Westinghouse Air Brakes—they *know* they can depend on extra savings. When you total up those savings in maintenance and parts replacement costs, plus the value of the

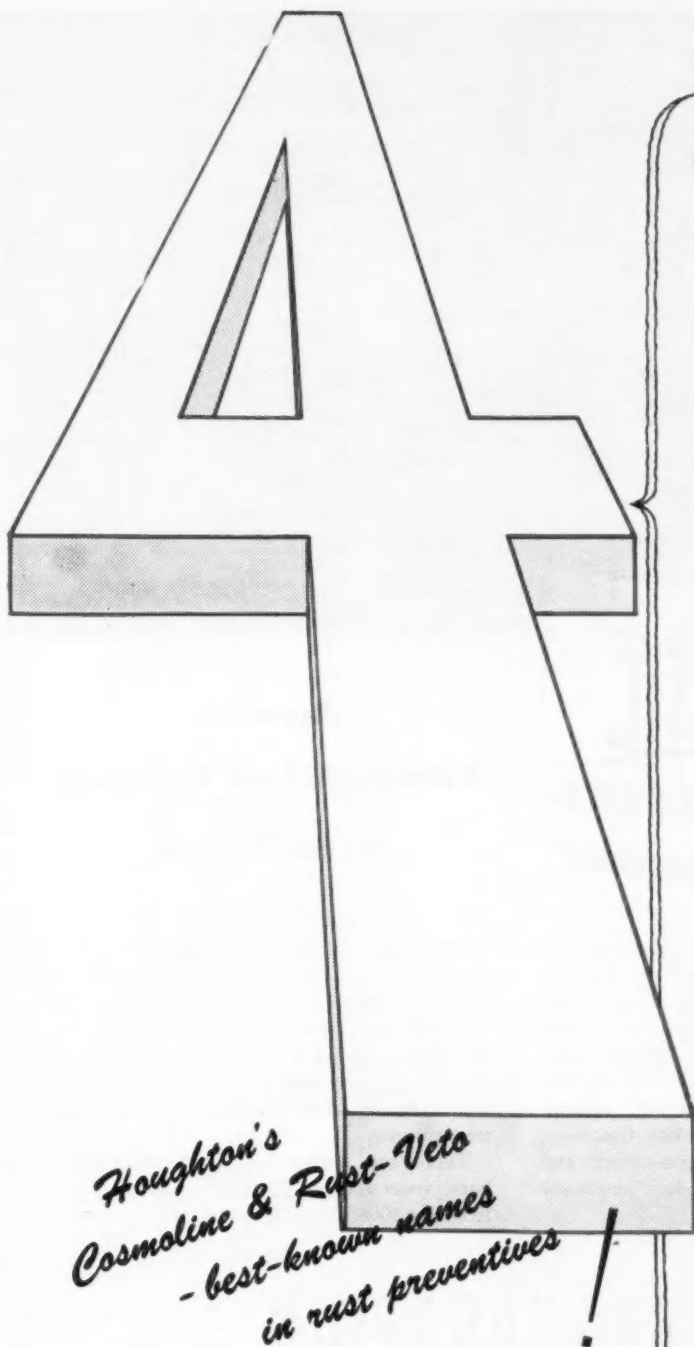
added time on the job, you realize what a good business investment Bendix-Westinghouse Air Brakes can be. Drivers prefer them, too, because the added confidence and reduced physical and mental strain mean better road time. Whether for old or new trucks, be sure of the best—always specify Bendix-Westinghouse Air Brakes.

THE BEST BRAKE IS



THE BEST AIR BRAKE IS

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY
ELYRIA, OHIO



*Houghton's
Cosmoline & Rust-Veto
- best-known names
in rust preventives*

4 items to consider before you buy rust preventives:

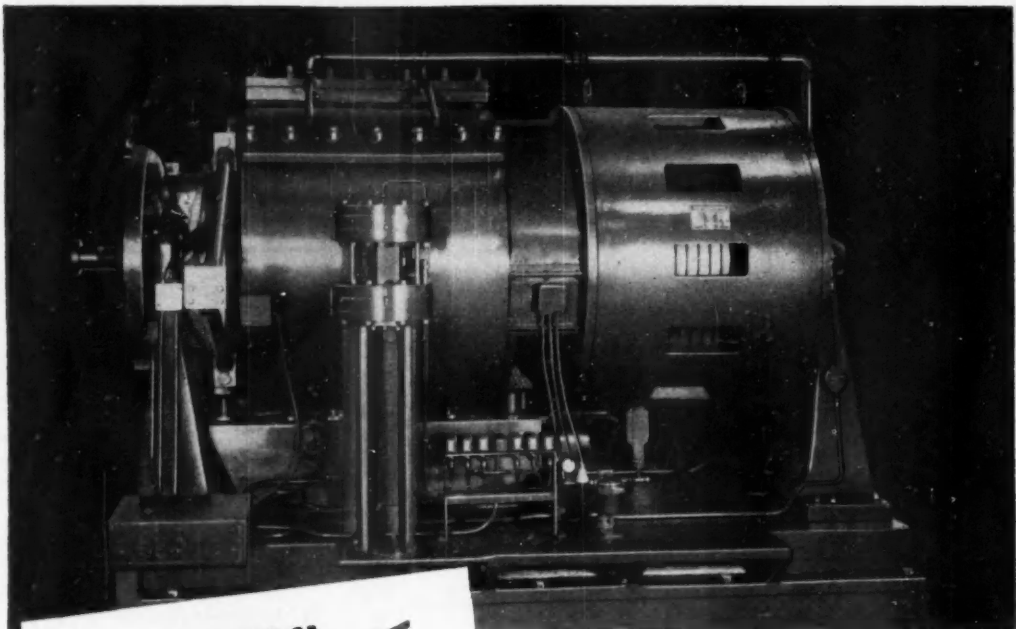
1 New government specifications are now being issued, reducing the number of varieties and combining Army, Navy and Air Force standards. There will be new Houghton products to meet those "specs".

2 Meanwhile the contracts you now have and those you obtain for metal products in the near future will specify the use of corrosion preventives identified by "spec" numbers which have been in effect since World War II. Houghton has time-tested approved products in its Cosmoline line which meet most of those former standards.

3 Houghton has just prepared a handy chart listing current specifications still in force. This is a single sheet with filing tab, showing the Houghton product brand meeting each type. Write for a copy.

4 Houghton, identified closely with rust prevention since 1867, also supplies a complete line of Rust Veto products for industrial use where no "spec" is listed. These also have stood the test of time, through 3 wars and industry's peace-time demands. The "All-Star Line-Up" folder lists the leaders in this series; write for it, also.

If metal corrosion is a serious problem, depend on Houghton to help you solve it. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa. Service and sales in most principal cities.



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Accurate Vibration-Free Readings at All Speeds

Dynamatic Dynamometers are characterized by extreme smoothness and freedom from vibration, providing quick, accurate readings at all speeds. Convenient, positive control is accomplished with simple, inexpensive, electronic equipment. These units are extremely flexible in operation, and are adaptable to a wide range of conditions, producing very high torques at low speeds, operating easily at high speeds, and offering a smooth and infinitely adjustable range of torque. Completely self-contained A.C. operation.

Dynamatic Dynamometers are extremely simple, compact, light in weight, and moderate in cost. They are available in absorbing, motoring, and universal types. The latter provide for instantaneous switching from absorbing to motoring and back, so that friction horsepower of an engine can be determined at attained operating temperatures.

There are almost unlimited possibilities in horsepower and speed combinations; horsepowers from 5 to 5000; speeds from 100 rpm to 30,000 rpm.

DYNAMATIC

CORPORATION

**KENOSHA
WISCONSIN**

Subsidiary of **EATON MANUFACTURING COMPANY, Cleveland, Ohio**

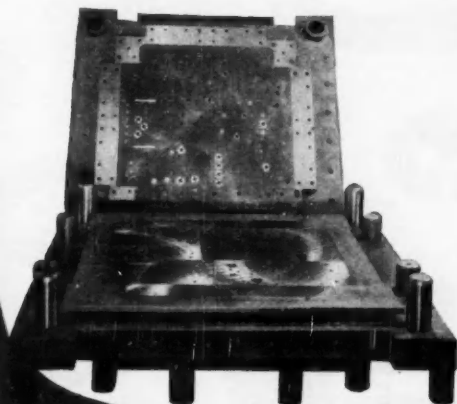
Dynamometers • Oil Well Draw-Works Brakes • Adjustable-Speed Couplings • Eddy-Current Brakes
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Dies are a vital factor in television chassis production, handling $\frac{1}{8}$ inch thick blanks of strip steel over 500 square inches in area . . . and they represent an important investment! Hundreds of hours of costly, painstaking die work are required to produce each one. Such an important investment must be protected. That's why they built their dies in



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Danly precision makes every Danly Die Set a reliable base for the finest die work . . . assures the greatest possible protection for a big die investment. Precision closure protects die components to assure longer production runs. And they save time in the die shop, too, because they're square and true.

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2100 South Laramie Ave., Chicago 50, Illinois



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Branches are located in: Chicago, IL; Detroit, MI; Kansas City, MO; Los Angeles, CA; Milwaukee, WI; Minneapolis, MN; New York, NY; Philadelphia, PA; St. Louis, MO; St. Paul, MN; Toledo, OH; Wichita, KS. For a complete list of branches, call 1-800-368-3683 or write to Danly Machine Specialties, Inc., 2100 South Laramie Ave., Chicago 50, IL 60616.



for top precision

Production to close tolerances mostly applies to metal working. But the technique of Western Felt production and processing has built an enviable reputation for engineering precision.

Chemical specifications must be perfectly met — parts from wool softness to rock hardness are cut to close tolerances. As an extremely versatile material Western Felts are resilient, flexible, compressible. They resist oil, water, heat age — do not ravel, fray or lose shape. New uses found daily. It pays to depend on Western Felt.

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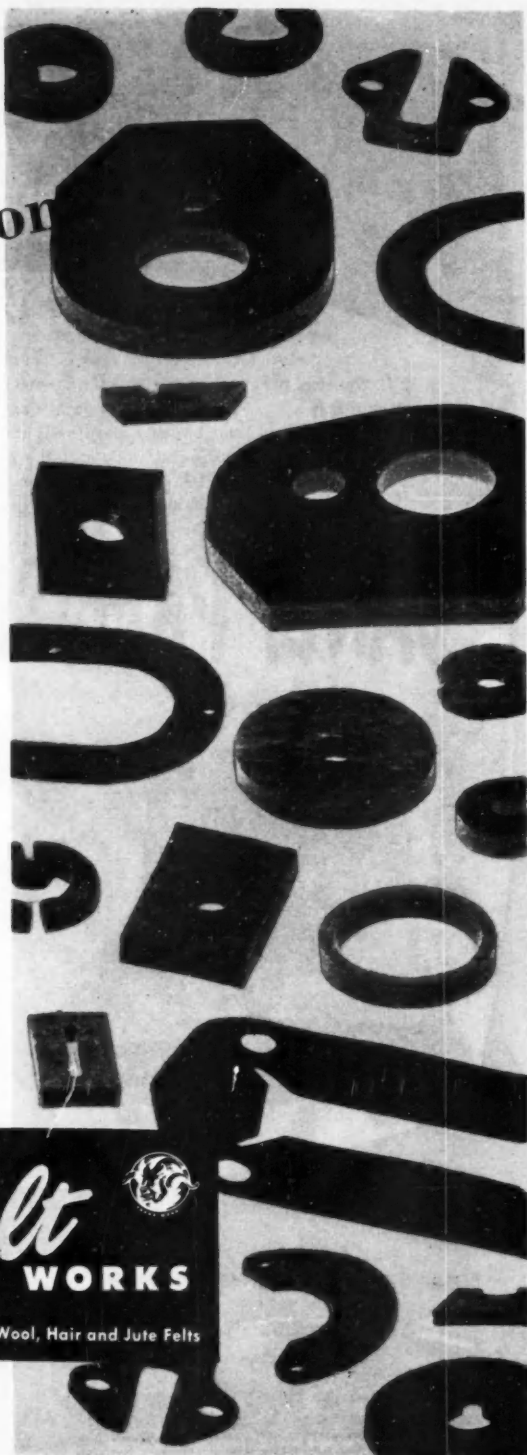
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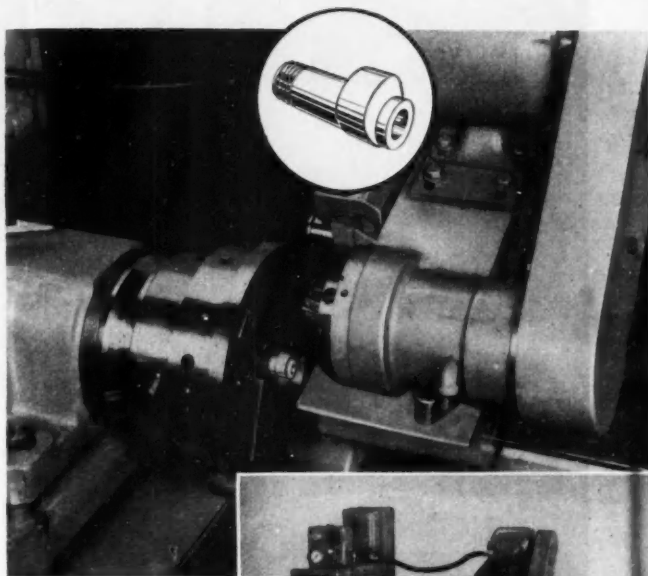
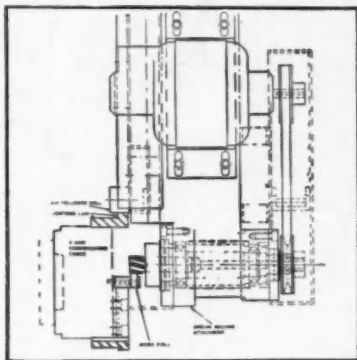
Acadia Synthetic Products Division, WESTERN FELT WORKS,
Processors of Synthetic Rubbers — Sheets,
Extrusions, Molded Parts.



MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

SPECIAL MILLING ATTACHMENT ON Lo-swing IMP CONTOUR MILLS PLASTIC CAMS



Close-up view, with chip shield removed, showing work in chuck.

Problem: To finish machine constant diameter cams of molded plastic material on a mass production basis. Two conditions had a direct bearing on the machining method employed on this job; (a) a very smooth finish was required and the cam contour had to be accurate within very close tolerances; (b) the shape of the cam made turning impractical. Consequently, a milling operation was decided upon.

Solution: The Lo-Swing IMP Lathe selected for this job was equipped with a special Milling Attachment, the movement of which is controlled by a master cam fitted to the outside of a compensating three-jaw chuck mounted on a low speed revolving headstock spindle. The work piece is carried on a centering plug fitted to the chuck body and driven by the compensating jaws, thus assuring accuracy between the bore of the part and the profile of the cam.

The machine cycle is completely automatic. The operator places the work in the air operated chuck and throws the starting lever. The headstock spindle starts to revolve; the milling cutter automatically advances to cutting position and the work piece is machined. At the end of the

Lo-swing IMP
equipped with
Special Milling
Attachment.
Chip shield
removed.



cycle, the milling cutter is automatically retracted to the starting position and the machine stops, ready for unloading and reloading. Contact between the master cam and the cam follower roll on the milling attachment slide is maintained by spring tension.

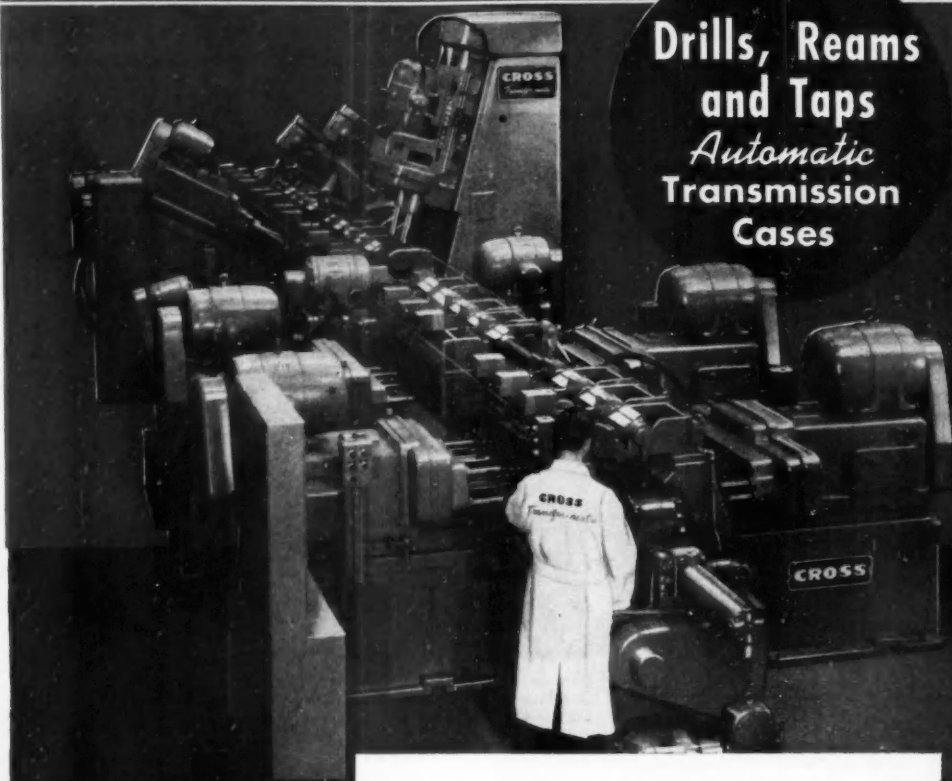
Seneca Falls engineers welcome inquiries involving difficult and unusual machining problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

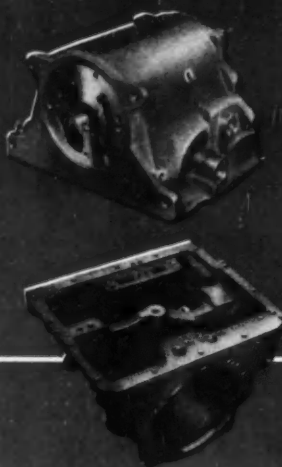
PRODUCTION COSTS ARE LOWER WITH Lo-swing

Another Transfer-matic by Cross

**Drills, Reams
and Taps**
Automatic
**Transmission
Cases**



- ★ Drills, chamfers, reams, and taps holes in ends, sides and top of 85 parts per hour at 100% efficiency.
- ★ 28 stations—1 loading, 7 drilling and 5 idle for ends, 1 indexing, 10 drilling and 4 idle for sides and top.
- ★ 83 cutting tools working on 32 different holes.
- ★ Part automatically indexes 90° in Station 14 to position for subsequent drilling of sides and top.
- ★ "Toolometers" group tool changes and stop machine when tools need sharpening; preset tools eliminate adjustments for tool changing and reduce down time.



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CROSS

DETROIT 7, MICHIGAN

Special MACHINE TOOLS



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To engine builders . . . and manufacturers of Diesel-powered equipment . . . and users of Diesel engines . . . this means: When an Exide does the cranking, your engines **START**.

You can count on a *quick breakaway, high cranking speeds, low voltage drop.*

You can count on trouble-free performance . . . in rugged service . . . in all climates.

You can count on long battery life and low cost maintenance . . . proved daily in buses,

trucks, trailer tractors, off-the-highway equipment, ships, power plants, Diesel-electric locomotives.

For dependable service at a saving, use Exide Diesel-cranking Batteries.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

WHATEVER YOUR CRANKING PROBLEMS

Exide's Research Staff—the largest in the industry—is ready to put its vast experience to work for you.

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CREATIVE ENGINEERING

GEARED TO QUANTITY PRODUCTION

75 MILLION BRAKES

PRODUCED FOR THE
AUTOMOTIVE INDUSTRY

Producing 75 million brakes is a remarkable accomplishment even in these days of large numbers and mass production methods. This remarkable record is made possible because Bendix Products Division has such things as —

A quarter century of specialized experience

Recognized engineering excellence

**Research that has set the pace
in design development**

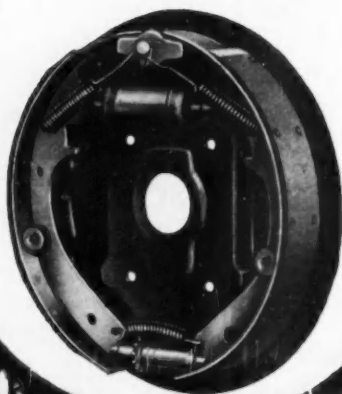
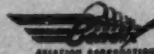
Proved manufacturing skill and capacity

**Overwhelming endorsement of the
automotive industry**

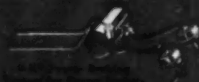
Manufacturers who put their braking problems up to Bendix — regardless of the type of vehicle — soon see what this matchless experience in the fields of creative engineering and quantity production can do.

BENDIX • PRODUCTS • SOUTH BEND

Export Sales: Bendix International Division, 72 Fifth Ave., New York 11, N.Y. • Canadian Sales: Bendix-Eclipse of Canada, Ltd., Windsor, Ontario, Canada



Disc Brake Assembly



Master Cylinder and Booster Assembly



Master Cylinder and Booster Assembly



Master Cylinder and Booster Assembly

BUILDERS
OF THE BASICS
OF BETTER
MOTOR VEHICLES



Master Cylinder and Booster Assembly



Master Cylinder and Booster Assembly



Master Cylinder and Booster Assembly



Drum Brake Assembly

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August Haurin, Jr., Los Angeles

**AUTOMOTIVE
INDUSTRIES**

Reg. U. S. Pat. Off.

AUTOMOTIVE INDUSTRIES, October 1, 1950

High Spots of This Issue

★ Nash Improvements, and Details of the Henry J

An article each on these two makes of cars brings the reader up-to-date on descriptions and specifications of the new models. Details of the Henry J are given on page 32. Improvements announced by Nash, in their Ambassador and Statesman models, are set forth on page 40.

★ Diesel Locomotive Engine Developments

The Diesel-electric has set itself up as a part of the great automotive industries. How heavily expanding railway Dieselization is affording manufacturers a large parts and equipment market is interestingly discussed in this report. See page 34.

★ Aircraft Industry Boom Under Way

Final formalization of a long-range aircraft procurement program by the Dept. of National Defense is at last aiding intelligent planning for future aircraft requirements. Previous to it the Korean situation tended to stampede the industry. In this account Robert McLaren points out the true nature of the boom. Page 38.

★ Track Design For Track-Laying Vehicles

Of added interest since outbreak of hostilities in the Far East is this timely analysis of problems which must be solved in making strong, economical, and efficient tracks for military vehicles. Engineering advices on track-laying devices begin on page 42.

★ Packard's New Bodies in Production

Unique structural features of the 1951 Packard bodies include a newly designed rear quarter which incorporates the wheelhouse as an integral part of the rear fender section. This and other structural innovations developed at the Briggs plant are discussed. Page 46.

★ 14 New Product Items And Other High Spots, Such As:

New engines and planes at the British Aero Display; latest equipment at Lockheed; obtaining wider steel sheets by welding; a hydraulic dynamometer having an internal cooling system; and the discussion on manpower and materials held at the Drop Forge meeting.

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For Complete Table of Contents, See Page 3*

Jet engine rotors

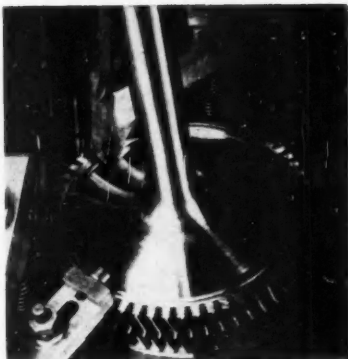
HYDRO - BROACHED

IN THREE AUTOMATIC OPERATIONS



Top requirements for turbine blade slots in jet engine rotors are speed and accuracy of machining. How CINCINNATI broaching equipment handles these requirements is illustrated here. The machine is a CINCINNATI No. 10-66 Single Ram Vertical Hydro-Broach, with tooling by Cincinnati Application Engineers. The broach holder is equipped with three rows of inserts, to finish the slots in three cuts. Upon completion of a downward stroke of the ram, the table retracts, the work holding fixture automatically unclamps, indexes to the next slot, and reclamps. After the ram has returned to the starting position, the table advances to cutting position and the cycle repeats. The photograph directly above shows the sequence of operations: No. 1 cut is from the solid all the way around, then No. 2 all the way around, then No. 3. CINCINNATI Hydro-Broach Machines, completely tooled up and ready for production, have reduced costs of hundreds of surface broaching and related operations, including such unusual jobs as the one illustrated here. Cincinnati Application Engineers can do just as much for you in paring your costs. Send blueprint of parts and complete data to Department E. S. For specifications on CINCINNATI No. 10-66 Single Ram Vertical Hydro-Broach, write for catalog No. M-1389-2.

This illustration shows the fixture used in broaching "Christmas tree" slots in one type of turbo-jet rotor.



Close-up of the clamping arrangement for the fixture shown in the illustration above.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

News of the AUTOMOTIVE INDUSTRIES

Vol. 103, No. 7

October 1, 1950

Shorter Month to Cut September Production

Although automobile and truck production continues at the high rate prevailing in August, September production figures when available are expected to show about 700,000 or a drop of about 120,000 units below the August total. The reason is that September has fewer working days because of the shorter month and the Labor Day holiday. October is expected

this year, and during the 1951 model run is planning to turn out 269,000 cars. The 1950 model run totaled 171,782 units. In the Rambler line a two-door sedan will be announced later this year or early in 1951, and it is understood that a four-door model will also be put into production later.

Buick Nearing 500,000 Annual Output Goal

Shortly after the war Buick announced that it was aiming at an an-

liminary estimate of 1950 private and commercial automobile registrations (excluding 145,000 publicly-owned vehicles) was 39,565,000 units, or nine per cent more than those registered in 1949. Trucks and buses registered in 1950 were estimated at 8,349,000 units, excluding 425,000 publicly-owned vehicles.

Tentative Plans Made for Detroit Automobile Show

Although plans to hold a national automobile show in Detroit next year have not been definitely approved by the industry, it is known that tentative plans are underway to enlarge or modify existing facilities at the State Fair grounds at Detroit to accommodate such an exhibition. If it were not for the unsettled international situation, approval would undoubtedly be given for an automobile show, but apparently there is some doubt now as to the propriety of an automobile show while the nation is in a state of war.

Five Companies Now Use GM Pay Formula

Agreement between Studebaker and the UAW-CIO brings to five the number of automobile companies who have accepted the GM formula calling for a five-year contract, wages geared to the cost-of-living, and an annual raise in base rates of four cents an hour. Other companies besides GM and Studebaker who are using the plan are Packard, Ford, and Kaiser-Frazer. It seems highly likely that the plan will be extended to the other companies sooner or later. In addition many supplier firms are adopting the formula, and it eventually may become standard throughout the automotive industries, doing away with the constant battling over wage rates.

To Assemble Crosleys in Mexico

Distribuidora Automotriz Crosley, S. A., currently sponsoring an exhibition of Crosley cars in Mexico City, Mex., is going to assemble and distribute the cars throughout Mexico under the name of Crosmobile. The auto-

FOR THE FRENCH

To be used for liaison and reconnaissance, this new French Army car, which resembles the U. S. Army Jeep, is being produced by the Delahaye company (see page 21, Sept. 15th AUTOMOTIVE INDUSTRIES). Designed to travel at speeds ranging from 2 to 60 mph, the vehicle is reported to have carried four passengers up grades of 65 to 70 deg.



Wide World

to be a high production month with 22 working days available, and apparently enough material in sight to maintain current high production rates. Also, most of the labor troubles have been settled making for uninterrupted production. Down time for model changeovers is not expected to hit this month at any major company, so the outlook is for another high production total for October.

Nash to Have Sedans in Rambler Line

Nash has ambitious plans for its 1951 model line announced late in September. The company expects to produce 80,000 vehicles during the rest of

nual production of 500,000 cars a year. Because of the continual interruptions and shortages which plagued the industry in the postwar period, there was some doubt that Buick would ever reach its goal. However, this year the division seems certain to surpass the half million mark, since 400,000 cars were sold by the middle of September. At the current rate of production, the company could reach the 500,000 mark by the first of December. Sales thus far are about 45 per cent ahead of last year.

Estimate Nine Per Cent Boost in 1950 Car Registrations

The Bureau of Public Roads, Dept. of Commerce, has revealed that the pre-

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MAKES THE GRADE

Powered by the four-cyl, 72-hp, F-head Hurricane engine (see page 34, April 1st AUTOMOTIVE INDUSTRIES), this new restyled four-wheel drive Willys-Overland station wagon is said to be capable of climbing grades up to 66.73 per cent.

mobiles are to be assembled in Mexico by Equipos Automotrices, S. A., at Monterrey, a subsidiary of Distribuidora Automotriz Crosley.

Nash and K-F Boost Prices

The upward trend of automobile prices touched off by Packard when it announced its 1951 models in late August is now well established. Packard raised prices \$81 to \$112 on its volume line. K-F increased its prices by \$10 to \$120 on its Kaiser line Sept. 13, representing an increase of 1/2 to 6 per cent. The price boosts amount to \$10 on the special business coupe, \$160 on the deluxe business coupe, \$80 on the special club coupe, and \$120 on four-door and special deluxe sedans and utility sedan. Two days later, Nash upped prices by 1 1/4 to 5 per cent ranging from \$29 for the Rambler series to \$77 on the Statesman and \$98 on the Ambassador series. Both K-F and Nash have been careful to point out that the price increases do not cover the full extent of increased costs. K-F pointed out that parts have risen approximately 10 per cent and labor rates about 7 per cent since the current model was introduced.

Perfect Circle Merges With Thompson Products

An agreement has been announced providing for the merger of the Perfect Circle Corp. with Thompson Products, Inc. by the exchange of Perfect Circle's assets for Thompson common stock. It was stated that the

present management of Perfect Circle would continue to direct the company's affairs, and that present sales and merchandising policies would not be affected. Final approval of the agreement will come, it was said, from Perfect Circle stockholders, to whom it will be submitted at a special meeting.

Stockholders of Thompson Products, Inc., will be asked soon to vote on a proposal to split the common stock two-for-one.

Col. Vincent to Retire from Packard Dec. 31

Col. J. G. Vincent will retire as executive vice-president of Packard at the end of this year. However, he will continue to act as a director and engineering consultant after that date. Leroy Spencer, vice-president and general manager of Earle C. Anthony, Inc., Packard distributor in California, has been made a vice-president, and will succeed Col. Vincent as executive vice-president Jan. 1. Col. Vincent has been associated with Packard for more than 38 years, starting as chief engineer in 1912. He is a former president of the SAE, and holder of nearly 200 automotive patents.

Machine Tool Group to Review Mobilization

To review mobilization plans of the machine tool industry in the light of developments in Korea and elsewhere, representatives of all branches of the machine tool industry will meet in Toronto, Canada, on Oct. 10th. The chairman of the group is Herbert L. Tigges, vice president, Baker Bros., Toledo, and president, American Society of Tool Engineers. Known as the Joint Machine Tool Industry Mobilization Reserve Group, the joint activity originally was an outgrowth of preparedness activities of the Manufacturing Production Div., National Security Resources Board.

1950 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1950 Seven Months' Totals.

MAKE	SEVEN MONTHS				Units				Per Cent of Total			
	July 1950	June 1950	July 1949	1949	1950	1949	1950	1949	1950	1949	1950	1949
Chevrolet	126,897	123,388	106,448	795,020	540,542	23.11	20.71					
Ford	99,694	106,582	70,887	674,565	418,804	19.61	18.05					
Buick	48,684	46,261	31,432	299,497	212,578	8.71	8.14					
Pontiac	36,279	30,616	30,480	249,530	171,283	7.23	6.88					
Plymouth	81,419	84,316	45,071	219,879	276,080	6.39	10.68					
Oldsmobile	33,153	31,649	24,931	209,422	147,088	6.09	6.84					
Mercury	28,772	30,153	18,080	185,467	93,720	5.39	3.89					
Studebaker	24,528	26,212	19,617	171,208	108,678	4.88	4.21					
Dodge	37,182	29,946	26,833	131,362	133,340	3.82	5.11					
Nash	20,251	19,780	13,551	109,850	78,361	3.19	3.00					
Hudson	15,918	14,072	12,293	88,801	89,479	2.50	3.43					
Chevrolet	16,134	14,957	11,175	65,579	69,704	1.81	2.67					
De Soto	14,173	12,085	8,703	49,370	55,624	1.44	2.13					
Cadillac	9,301	8,839	6,821	47,848	47,266	1.39	1.81					
Packard	7,046	7,146	9,267	44,979	57,717	1.31	2.21					
Kaiser	13,116	9,578	6,595	37,783	37,847	1.10	1.45					
Lincoln	3,306	3,021	2,589	19,496	22,723	.57	.87					
Willys	4,522	3,447	2,911	19,386	16,746	.56	.64					
Fraser	1,677	2,206	1,191	9,619	12,527	.26	.40					
Crosley	754	612	767	3,958	6,917	.11	.26					
British Austin	606	396	282	3,450	1,815	.10	.07					
British Ford	199	110	414	742	4,095	.02	.16					
Misc. Foreign	882	583	364	3,533	1,876	.10	.07					
Misc. Domestic	222	87	16	411	1,451	.01	.08					
Total—All Makes	609,926	583,937	448,477	3,439,853	2,610,093	100.00	100.00					

* Data from R. L. Polk & Co.

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More Military Contracts to Automotive Field

More military contracts are coming into the automotive industries, but their nature is such that they will not interfere with production of cars and trucks to any degree for several months. Ford has a contract with the Air Forces to build aircraft engines at the government plant in Chicago occupied postwar by Tucker and used in World War II by Chrysler for aircraft engine production. Negotiations are also underway with Buick, but details are not yet clear although it is reported that a new plant will be built. Packard has received a \$4 million development contract for Diesel marine engines. Just what the engine is has not been revealed, but Packard expects to have ample facilities at its Detroit plant to handle the size of operation called for in the contract. Cadillac has received an Ordnance contract totaling about \$2 million for parts for engines and transmissions for light tanks. Monroe Auto Equipment Co. is also reported to have an order totaling approximately \$285,000 for production of 57-mm shells. Marvel-Shebler Carburetor Div. of Borg-Warner has an order for fuel pumps for jet plane engines and will produce them in the new plant which will be opened soon at Decatur, Ill.

The Ford engine contract calls for production of the 28-cyl Wasp Major radial aircraft engine rated at about 3500-hp to be used in the B-36 bomber. It is currently being used in several other types of plane including the B-50, C-97, C-74, C-124, and several others. The contract is the outgrowth of talks which started in 1948 between Pratt & Whitney and various automobile companies at the request of the Air Forces. It will take several months to tool the Chicago plant for production. Pratt & Whitney will lend technical assistance in the form of information and specialists to get the program going. The Ford contract is one step in a series of licensor-licensee agreements to be sponsored by the air materiel command. It is understood but not yet confirmed that the Buick order will cover power plants to be built under license from Pratt & Whitney. It is reported that the new facility to be built at Flint will be retained by Buick after completion of its war work.

Pacific Airmotive Corp. has been awarded an extensive contract to rework, modify, overhaul, and reactivate a large number of military planes. The contract is with the USAF Materiel Command, Dayton, O., and brings PAC's backlog to over \$15 million.

Scintilla Magneto Div., Bendix Aviation Corp., Binghamton, N. Y., has re-

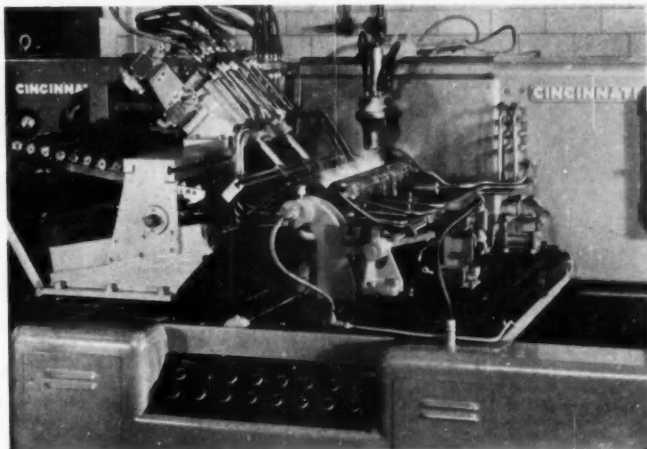
ceived more than \$2 million in defense contracts. The largest of the four orders was from the U. S. Air Force, which is buying \$1.6 million in equipment and parts, and the remainder was from the Navy.

The Boeing Airplane Co. has been given authority to build additional quantities of C-97 Stratofreighter transports and B-50 Superfortress bombers in the Seattle area, and an increased quantity of the B-47 Stratojet bombers at Wichita.

U. S. Air Force contracts valued at \$6,485,210 have been recently received for processing by the Chicago AF Procurement Field Office.

The U. S. Dept. of Commerce has also announced the following Defense

Dept. contracts: Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., pilot shaft assy. used on automatic engine control 1630-6F for F8F-2 (all aircraft), \$52,197; control: automatic engine for use on F8F-2 (all aircraft), \$122,810; tools & test equip. for overhaul aircraft instruments, \$62,617; Aeroquip Corp., Jackson, Mich., coupling: half hydro. self sealing, \$28,724; DeJur-Amsco Corp., Long Island, N. Y., indicator, cold cylinder, \$30,843; GM's Rochester Prod. Div., Rochester, N. Y., regulator assy: manifold pressure for use on engine R3350-30W for P2V-4, five aircraft, \$76,774; Hydro-Aire Corp., Burbank, Calif., valve: fuel shut-off for use on F9F-2-3 aircraft, \$78,291; and Ohio Rubber Co., Willoughby, O., track assemblies, \$35,685.



CAMSHAFTS HARDENED FASTER

Since the time that the Flamatic method of selective hardening was developed several years ago by the Cincinnati Milling Machine Co., many applications have shown it to be advantageous because of its rapid heating cycle and the uniform depth of hardness obtained with a minimum of distortion. Automatic loading mechanisms such as the one described here seem to point the way to further savings in time and labor.

Dodge is hardening camshafts at the rate of 100 per hour on a Cincinnati Flamatic especially equipped for this type of work. Camshafts to be selectively surface hardened are placed in a rack at the left end of the machine as illustrated. From that point, they are automatically loaded in position between

the flame heads, heated, quenched, and removed from the machine in a continuous cycle.

Operation of the machine is as follows: after a camshaft has been placed in position between centers by the ram of the loading mechanism, it is rotated by a motor-driven spindle while being heated by flame heads located so as to localize heat in the areas to be hardened. When the cam lobes reach the desired temperature, flames are extinguished, flame heads retract, the spindle stops rotating and retracts to allow the camshaft to be lowered into a quenching bath. Lowering of the camshafts into the quenching fluid is accomplished by an automatic device, and a partially submerged conveyor belt removes them from the quench tank.

Marvel-Schebler Adds Fuel Pump to Line

Robert J. Minshall, president of Pesco Products Div. of Borg-Warner, has also been named vice president and general manager of Marvel-Schebler Products Div., formerly Marvel-Schebler Carburetor Div. S. W. Gray will remain as president of Marvel-Schebler as a consultant on sales policy. Production of fuel pumps for jet plane engines marks an expansion in the division's activities which are being transferred from Flint, Mich., to a new plant at Decatur, Ill. (see cut on this page). The plant has been equipped with new machinery for fuel pump manufacture which is expected to begin about the middle of this month.

will also remain a member of the company's board of directors and executive committee. In addition, he will handle special assignments on a part-time basis. Mr. Davis is recovering from a recent illness, and his decision to relinquish his sales activities was made on the advice of his physicians. Appointment of his successor is expected to be announced within two weeks.

Rubber Makers Reactivate Synthetic Plant

Ten rubber companies have jointly set up a new corporation to reactivate and operate the government-owned \$7 million synthetic rubber plant in Louisville, Ky., under contract with the RFC.

Matthews, vice president; Simplex Wire & Cable Co., Cambridge, Mass., Everett Morss, president; Sponge Rubber Products Co., Shelton, Conn., Frederick M. Daley, president; and Thiokol Corp., Trenton, N. J., J. W. Crosby, president.

K-F to Build Stamping Plant in Ohio

Kaiser-Frazer will build a \$3 million pressed steel plant on the Ohio River at Shadyside, Ohio. It is understood that K-F is making the move because of the freight differential on processed parts over the raw steel. The stamping operations at Willow Run will be continued, but may possibly be reduced somewhat in volume. K-F has acquired



THREE DIMENSIONAL HOME

Shown here is a three-dimensional scale model of the new home of Marvel-Schebler Div., Borg-Warner Corp., which is being readied for production in Decatur, Ill. With the completion of this plant all operations of this division, formerly located in Flint, will be concentrated in Decatur. With a floor space of 130,000 sq ft it will have a capacity for building 100,000 carburetors a month. It is of interest that the company is today one of the principal sources of carburetors for tractors

and industrial engines. Supplementing the manufacturing plant will be a modern building housing the engineering department and laboratory facilities. In developing the plant layout, as illustrated, careful attention was paid to a smooth flow of materials and arrangement of operations in straight lines from one end of the building to the other. Thus the arrangement of manufacturing departments together with the flow of materials in orderly fashion will result in a fast economical operation.

Piasecki to Expand Plant

The Piasecki Helicopter Corp., Morton, Pa., has announced a building expansion program, which together with the leasing of additional facilities, will provide a 175 per cent increase in plant area over that available a year ago.

Davis Resigns as Ford Sales-Ad Chief

Henry Ford, 2nd, president, Ford Motor Co., has announced that J. R. Davis has resigned as vice president—sales and advertising for the company. Mr. Ford said that Mr. Davis will continue to serve as a vice president, and

The new corporation is known as Kentucky Synthetic Rubber Corp., and Thomas Robins, Jr., president, Hewitt-Robins, Inc., N. Y. was elected president. The participating companies and directors of the new corporation are as follows: American Hard Rubber Co., N. Y., N. Y., Frank D. Hendrickson, president; Boston Woven Hose & Rubber Co., Cambridge, Mass., J. H. Bierer, vice-president; Brown Rubber Co., Inc., Lafayette, Ind., Edward A. Callanan, president; Dryden Rubber Div., Sheller Manufacturing Co., Portland, Ind., Oliver Vinnedge, vice president; Goodall Rubber Co., Trenton, N. J., Frederick B. Williamson, Jr., president; Hewitt-Robins, Inc., N. Y., N. Y., Thomas Robins, Jr., president; Raybestos-Manhattan, Inc., Passaic, N. J., John H.

a 65-acre tract for the plant which will contain about 50,000 sq ft of space, and is expected to be in operation within six months.

Nickel Shortage Spurs Research on Plating

With nickel under allocation, and with the outlook for the future supply critical, automobile plating departments are doing some intensive research on ways of getting by with less of the scarce material on plated parts. With new models apparently carrying more chrome than ever, the problem will be aggravated unless some way is found to reduce the amount of nickel required in the plating process. One approach is to attempt a heavier coat-

INDUSTRIES

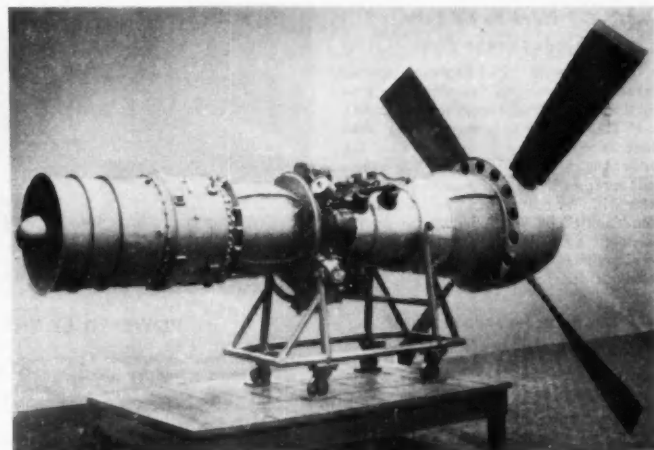
ing of copper and less nickel plating on ornamental parts which are not subject to abrasion or scuffing. Copper itself has not been too tight although it is not particularly plentiful, either. The feeling is that lifting of import duties on copper and opening up of some higher cost mines will alleviate any severe shortage.

Automotive Industries Publishes Book on Automatic Drives

A comprehensive book covering all automatic transmissions and torque converters developed during the past several years in the U. S. for motor vehicles, comprising original articles as published in *AUTOMOTIVE INDUSTRIES*, has just come off the press. The book covers the various passenger car automatic transmissions, and, in addition, the Allison torque converter, the White Hydro-Torque, and the Fuller torque converter.

Vauxhall Gives Research Grant to Cambridge

Vauxhall Motors Ltd., GM British subsidiary, has presented the department of physical chemistry at Cambridge University, England, a grant of £1000 (\$2800) annually for two years. C. L. McCuen, general manager of GM Research Laboratories, says that the money may be used for research in the physical properties of metal surfaces. Dr. B. P. Bowden, international expert on friction, who is in



DELIVERS 5700

The Pratt & Whitney Aircraft T-34 Turbo-Wasp, shown here, delivers 5700 hp through a propeller and jet thrust. It was developed by Pratt & Whitney Aircraft at its East Hartford, Conn., plant under the auspices of the U. S. Navy's Bureau of Aeronautics. The T-34 is 155 in. long, has a basic diameter of 30 in., and weighs 2550 lb.

charge of the grant, will decide what avenues of exploration are to be followed.

Lycoming to Build Engines for Defense Program

In line with its policy of spreading production of military goods throughout the country, the Detroit Tank Ar-

senal has designated Lycoming Spencer Div. of Avco Mfg. Corp. as an additional source of engines for tank and combat vehicles. Heretofore the principal source of the aircooled engines used in such vehicles has been Continental Motors. Lycoming, which produced tank and aircraft engines in World War II, is located at Williamsport, Pa.

1950 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1950 Seven Months' Totals.

MAKE	SEVEN MONTHS						
	Units			Per Cent of Total			
	July 1950	June 1950	July 1949	1950	1949	1950	1949
Chevrolet	48,040	35,438	28,256	231,693	200,766	38.96	37.02
Ford	30,986	25,773	14,968	178,426	97,072	28.13	17.90
International	10,150	7,926	7,385	56,180	52,670	8.95	9.71
G.M.C.	9,864	7,304	7,127	51,855	48,558	8.26	8.60
Dodge	9,155	5,969	9,169	46,717	67,200	7.45	12.39
Studebaker	4,674	3,520	4,885	27,438	33,117	4.37	6.11
Willys-Overland	1,718	1,385	1,306	7,822	12,682	1.25	2.33
White	980	905	626	6,004	4,522	.86	.88
Mack	678	680	524	5,296	3,564	.84	.66
Willys-Jeep	721	724	1,096	4,680	9,791	.75	1.81
Diamond T	499	436	347	3,130	3,298	.50	.61
Divco	332	308	279	2,137	2,182	.34	.40
Reo	297	271	228	1,826	2,397	.29	.44
Autocar	180	166	108	1,153	1,052	.18	.19
Brockway	165	180	113	1,152	888	.18	.16
Pontiac	126	138	37	1,032	253	.16	.05
Federal	100	104	61	763	805	.12	.15
Kenworth	85	63	34	328	247	.05	.05
Crosley	45	30	44	275	628	.04	.12
Sterling	33	25	20	200	148	.03	.03
F.W.D.	27	24	20	181	214	.03	.04
Misc. Domestic	108	104	211	763	1,876	.12	.34
Misc. Foreign	18	29		230		.04	
Total—All Makes	117,040	91,512	76,866	627,466	542,292	100.00	100.00

* Data from R. L. Polk & Co.

SKF Expanding Plant in Philadelphia

Providing over 40,000 sq ft of floor space, a plant addition is being built by SKF Industries, Inc., at its ball and roller plant in Philadelphia.

GM 1949 Income Taxes Nearly Half-Billion

Last January, Alfred P. Sloan, Jr., GM board chairman, in commenting upon the large taxes GM pays said that "it would seem that the government ought to encourage that kind of performance." Announcement of the income tax GM will pay on 1949 earnings emphasizes his point. In September, GM made a third quarter payment of nearly \$109 million and a final payment of more than \$111 million to be made Dec. 15 will bring the total for 1949 to \$444,377,889.

K-F Cars to be Built by Japanese Firm

Kaiser-Frazer is negotiating an agreement which may result in the production of K-F automobiles in Japan. K-F Export Corp. is negotiating with East Japan Heavy Industries Ltd. for an arrangement under which K-F would sell components to the Japanese concern which would build the cars in its own facilities. There would be no investment by K-F in the deal. It is understood that production initially would be about four cars a day.

Exide to Renovate Plant in Connecticut

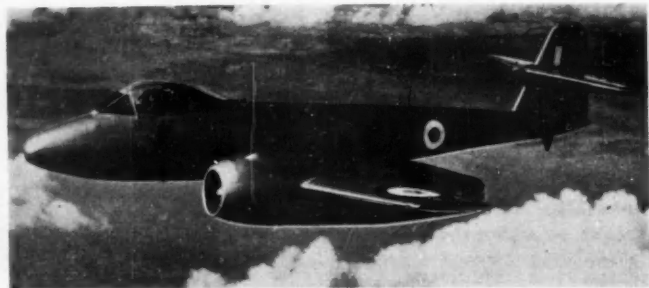
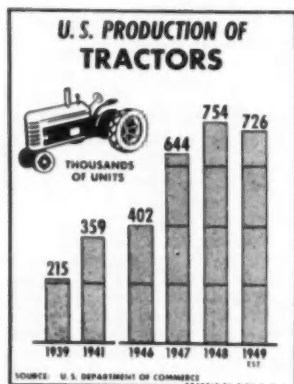
The Electric Storage Battery Co. has announced plans to begin immediate renovation and equipment of a plant in Fairfield, Conn., for the manufacture of Exide automotive batteries for distribution in the New England area.

1951 Hydra-Matic to Have Improved Reverse Shift

Hydra-Matic transmissions on 1951 automobiles will show a definite improvement in reverse gear shifting. Shifting into reverse on the current Hydra-Matic is sometimes not accomplished as readily as the designers would like and changes have been made in the mechanism to overcome that objection. With improved reverse gear selection, the owners of Hydra-Matic transmissions will be able to rock the car in mud and snow.

Buick Convertible Sales Boosted by Hardtops

The popularity of the so-called hard-top convertible line is proved by figures



Acme

POWERED BY THE MOST POWERFUL

This new British interceptor fighter plane, the Gloster Meteor 8, is powered by two new Armstrong Siddeley Sapphire jet engines. Described as the world's most powerful jet engine, the Sapphire develops 7200 lb thrust.

released by Buick on its production of convertibles. The division will make about 75,500 convertibles in both hard-top and softtop design this year, considerable more than double the 33,835 built last year. More than 21 per cent of all unfilled orders is for convertible models.

Allison Gets CAA Approval of Turbo-Jet Engines

GM's Allison Div. has received CAA approval for use of centrifugal compressor turbo-jet and axial flow compressor turbo-jet aircraft engines in commercial transport operations. The division is the first engine manufacturer to receive CAA approval on such engines. The Allison 450-D4 is an axial flow turbo-jet engine with a power rating of 5900 lb thrust. The model 400-C4 is a centrifugal type turbo-jet developing 4600 lb thrust, and was the first jet engine ever to receive CAA approval, being certified in May, 1948. Later and more powerful models of both engines are in production and under development, but are available only to the military.

Allison Leases Idle Plant for Tank Transmissions

GM's Allison Div. has leased a vacant plant at Indianapolis from the Chrysler Corp. for production of the new transmission to be produced for the tanks to be built by Cadillac. The plant has about 215,000 sq ft of floor space, and production of transmission parts will start before the end of this year. The new unit brings to six the number of separate facilities in Indianapolis operated by Allison.

Sargent & Greenleaf Making Tank Controls

Sargent & Greenleaf, Inc., Rochester, N. Y., is manufacturing the steering and transmission controls for the 47-ton General Patton tank. The precision devices, said to be the first of their kind ever made, are being shipped to GM's Allison Div. to be assembled with the transmission mechanism.

Motor Products Proposes to Double Stock Shares

Stockholders of Motor Products Corp. will vote Oct. 4 on a proposal to double the number of outstanding common stock shares to one million from 500,000, \$10 par value. The company says that there is no immediate reason for increasing the number of stock shares and that the move anticipates future requirements.

Rinshed-Mason Buys Plant in California

The Rinshed-Mason Co., Detroit, has purchased the former Caltone plant, located on a four-acre site in Anaheim, Calif. The property is to be converted to the manufacturing and warehousing of automotive and industrial finishes, automotive refinishing materials, and allied products.

Truck Trailer Sales Ahead of Year Ago

The truck-trailer builders, like the vehicle manufacturers, are doing much better this year than they did a year

INDUSTRIES

ago. For the first six months of this year, the industry built 26,270 trailers, compared with 16,129 units for the same period of 1949. In addition, the first six months of last year accounted for three-quarters of the total for the year whereas currently orders are continuing at a high rate and for the year will exceed the 1949 total by a wide margin.

GM Buys Stinson Plant

GM has purchased the former Stinson Aircraft Co. plant and airport on VanBorn Road near Wayne Road in

Ford Names Jeter Head of Cleveland Foundry

E. Claude Jeter has been named manager of Ford's new production foundry which is under construction at Cleveland. He formerly was manager of the Dearborn Iron Foundry, and is succeeded in that post by Harry G. McMurry, who joined Ford in February of this year as assistant manager after being associated with GM in various foundry capacities since 1927. While with GM, he supervised construction of a modern production foundry in Australia, the first automotive type facility in that country.

increased since the start of the Korean War, and at the same time to set up fair distribution to established commercial customers.

Postwar Cars Outnumber Washing Machines

The automobile industry has made an amazing record since the end of the war when compared with other industries. Actually more automobiles have been manufactured in that period than washing machines, and nearly as many cars have been built as refrigerators. Since the war, the industry has turned out about 19 million cars or nearly

REGIONAL SALES OF NEW PASSENGER CARS

Sales of new passenger cars reached an all time high of any month in automotive history during July, exceeding June by about 4 1/2 per cent and July of 1949 by 36 per cent. The great bulk of this increase can be attributed to those states in the West South Central region which registered a gain of approximately 40 per cent. The South Atlantic and the East North Central states showed a decline in July as compared with June and sales in the Middle Atlantic states were practically the same as for June. In comparison with July, 1949 all regions showed a marked increase, the U. S. average being 36 per cent. During the first seven months of 1950, new car sales were about 32 per cent above the same period a year ago.

Zone	Region	July		June		July		1949		Per Cent Change		
		1950	1950	1950	1950	1950	1950	1949	1949	July over June	July over July 1949	Seven Months 1950 over 1949
1	New England	41,178	38,440	24,831	201,017	154,352				+3.00	+48.83	+30.55
2	Middle Atlantic	117,180	117,092	84,973	654,770	500,279				+0.07	+38.63	+38.60
3	South Atlantic	70,305	71,804	50,585	412,487	297,606				-2.09	+38.98	+38.89
4	East North Central	142,259	147,823	112,161	843,000	671,475				-3.76	+26.83	+25.54
5	East South Central	32,680	30,922	21,152	163,756	130,290				+5.70	+54.53	+41.64
6	West North Central	67,252	64,078	51,479	383,040	271,665				+4.95	+30.64	+33.63
7	West South Central	61,573	44,032	36,740	311,818	212,475				+30.84	+67.55	+48.61
8	Mountain	25,790	22,898	14,754	123,799	87,716				+12.91	+71.41	+41.00
9	Pacific	92,203	48,348	51,793	346,541	204,237				+6.79	+6.79	+21.92
Total—United States		609,926	563,937	449,477	3,439,863	2,610,093				+4.45	+36.00	+31.79

States comprising the various regions are: Zone 1: Conn., Me., Mass., N. H., R. I., Vt.; Zone 2: N. J., N. Y., Pa.; Zone 3: Del., D. C., Fla., Ga., Md., N. C., S. C., Va., W. Va.; Zone 4: Ill., Ind., Mich., Ohio, Wis.; Zone 5: Ala., Ky., Miss., Tenn.; Zone 6: Iowa, Kan., Minn., Mo., Neb., N. D., S. D.; Zone 7: Ark., La., Okla., Tex.; Zone 8: Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.; Zone 9: Cal., Ore., Wash.

Romulus Township, near Detroit. The 240,000 sq ft plant, which has been owned by Air Fleets, Inc., since the war, will be operated by GM's Detroit Diesel Engine Div. for the manufacture of auxiliary generators to be used in the tanks that will be built by the newly-organized tank plant of the Cadillac Motor Car Div. of GM.

Marmon-Herrington Gets Big Trolley Bus Order

Marmon-Herrington Co. has received an order for 349 trolley coaches from the Chicago Transit Authority, the largest order ever placed in this country by any transit company. The aggregate cost of the order was \$5,979,417. Delivery will start around Feb. 1, and the order is to be completed by the end of next year. Marmon-Herrington entered the trolley coach field four years ago. It also manufactures motor coaches and All-Wheel-Drive trucks.

Ohio Piston Buys Deluxe Products Piston Div.'s Equipment

Jas. S. Allan, president, Walker Manufacturing Co. of Wisconsin, Racine, Wis., and the Deluxe Products Corp., LaPorte, Ind., has announced that the machinery, tools, patterns, and equipment of the Deluxe Products Piston Div. have been sold to the Ohio Piston Co. Cleveland, O. The machinery and equipment of the Deluxe Products Piston Div. will be shipped to Cleveland and consolidated with the existing facilities at the Ohio Piston plant there.

Dow Puts Magnesium Under Allocation

Dow Chemical Co. has put into effect a program for voluntary allocation of magnesium. The program is designed to assure an adequate supply for military requirements, which have

enough for one of every two families in the country. During the same period, slightly more than 15 million washing machines and about 20 million refrigerators have been produced.

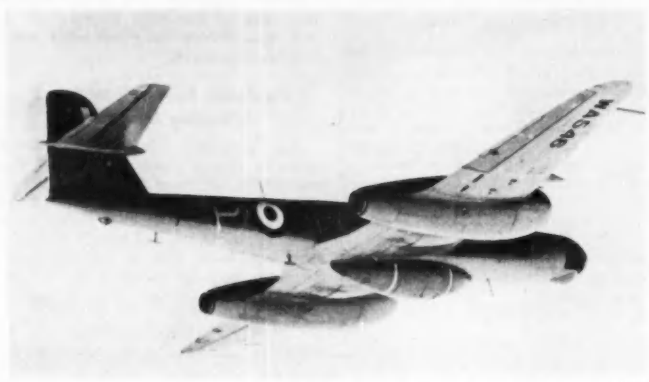
More Women Being Hired as Manpower Tightens

Manpower is becoming increasingly tight in Detroit, and as a result women are being hired in increasing numbers. Stepped up production schedules in the automobile plants have resulted in a shortage of workers, particularly in the skilled categories. Women are being added at the rate of about 2000 a day in Detroit.

Firestone to Build New \$5 Million Tire Plant

The construction of a \$5 million tire plant at Des Moines, Iowa, has been announced by the Firestone Tire &

News of the AUTOMOTIVE INDUSTRIES



RADAR IN THE NOSE

This new British Armstrong Whitworth Meteor NF-11 night fighter plane is powered by two Rolls-Royce Derwent jet engines. The elongated nose contains the latest radar equipment, and, in fact, the plane is called "The Flying Radar Station."

Rubber Co. It is expected that the new tire plant will be in production in the early spring of 1951.

Kropp Forge Backlog Totals \$5 Million

Now totaling over \$5 million, the Kropp Forge Co.'s backlog of unfilled orders has necessitated the starting of a second shift in order to expedite delivery of critical forgings for light and heavy tanks, jet aircraft engines, gun barrels and other essential war material.

GM Appoints Rollert to Defense Assignment

GM has named E. D. Rollert to handle special defense assignments. He will be assistant to J. E. Goodman, general manager of the B-O-P division. For the past two years he has been administrative assistant to the general manager of the New Departure Div. at Bristol, Conn.

Magnaflux Moves Into New Office in Texas

The Magnaflux Corp. has moved into its new office in Dallas, Tex. The previous office and shop was destroyed by the aircraft crash in Dallas last November. A complete office serving the entire Southwest has now been set up, and included in the new building is an inspection laboratory where local inspection work can be done. Magnaflux is also equipped to handle work in the field.

Ford Modernizing Parts Distribution Depots

Ford is currently engaged in an extensive modernization program covering eight major parts depots. The improvements include floor flush conveyor systems, modern materials handling equipment, and rearrangement of stocks. The range of service parts carried will also be expanded and shipping facilities at Omaha, Jacksonville and Oklahoma City will be enlarged. Other depots in the modernization program are at Salt Lake City, New Orleans, Denver, Des Moines and Richmond, Calif.

First Industry Controls Not Too Burdensome

It is still too early to tell what effect the first two government control orders under the National Defense Act will have on the automobile industry. However, opinion is that neither will be too drastic, at least for the present. The regulation controlling credit is not expected to affect new car sales very much since a large percentage of dealers right along have been requiring down payments and installment balances quite near the terms imposed under Regulation W. Used car sales will probably be affected, more particularly on the latest models which are expected to drop some in price. However, it is believed that used cars two or more years old will stabilize the market to some extent since the down payment would be within reach of a large number of buyers who cannot meet the

terms for very late models or new automobiles. The second order dealing with inventory controls has no immediate significance for the automotive industries since it has been next to impossible to accumulate any advance inventories of most critical materials covered, particularly steel and nickel. The controls do not set a definite day's supply, but rather restrict inventories to the smallest quantity from which a company can easily meet deliveries on the basis of currently scheduled methods and rate of production. With the automobile industry straining for materials to keep up with the high tempo of production for the past several months, there has been little chance to accumulate steel, but rather it has been a hand-to-mouth struggle to keep lines going. Only an unexpected slump in the demand for automobiles might create a problem of holding inventories in line with the order, but that seems unlikely at present.

Military to Buy Through Fixed Price Contracts

The Pentagon has decided to do most of its buying through fixed-price contracts. Armed forces procurement officials say that they hope the move will save the government money and at the same time encourage efficiency in production. The Defense Dept., in outlining its new buying and pricing policy recently said that it expected to allow "adequate profit margins" as an incentive for efficient industrial performance. But it warned that "allowances for contingencies" would be cut out "to the greatest extent possible."

The effect of the new pricing policy is to conserve limited manpower, materials, facilities, and other resources, as well as to support government controls over prices, wages, and materials, according to the Munitions Board, overall buying agency for the Army, Navy, and Air Force. Fixed-price contracts will be used without provisions for price redetermination or escalation throughout the Defense Dept. whenever practicable, the board stated. But it indicated that "incentive-type" contracts would be used where dollar amounts are large, production periods long, and when "reasonably close" target prices can be established. The new policy will limit cost-reimbursement type contracts to cases in which other types of contracts are "not suitable," and where the contractor's cost-recording system facilitates audit and where close checks can be made during performance of the contract to assure that the contractor is not employing "wasteful or extravagant methods."

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers.

General Motors Corp.—**Edward D. Rollert** has been appointed as Asst. to the general Manager of the Buick-Oldsmobile-Pontiac Assembly Div. Mr. Rollert was formerly Administrative Asst. to the General Manager of the New Departure Div. of General Motors.
Chevrolet Motor Div., General Motors

Corp.—The following appointments have been announced: **Norman J. Johnson**, Asst. Manager Sales Promotion Dept. and **F. T. Hopkins, Jr.**, Asst. Zone Mgr., Flint.

Ford Motor Co.—**E. Claude Jeter** has been named manager of the company's new production foundry at Cleveland. **Harry G. McMurtry** has been appointed manager of the Dearborn Iron Foundry, succeeding Mr. Jeter.

North American Aviation, Inc.—**Alexander T. Burton** has been elected a Vice-President.

Detroit Diesel Engine Div., General Motors Corp.—**John Lundahl** has been appointed to the newly created position of Sales Representative-at-large. He will be on special assignments, working with regularly assigned sales representatives throughout the country.

Tidewater Assoc. Oil Co.—**Fred H. Mathews** has been appointed manager, Crude and Products Dept.

Colonial Broach Co.—The following appointments have been announced: **Ralph G. Lagerfeldt** has been named Executive Vice-President; **Harry Gotberg** is Vice-President and will supervise sales engineering, experimental engineering and estimating; **William Kukuk** has been appointed factory manager; **B. F. Welte** is now chief engineer and **Glen Harmon** is assistant chief engineer. **Hans Reitz** has been named supt. of machine construction.

Minneapolis-Honeywell Regulator Co.—**Raymond O. Anderson** has been designated by the company as its representative in an atomic energy study program for industry sponsored by the Atomic Energy Commission.

General Electric Co.—**Robert Paxton** has been elected a vice-president. He is manager of manufacturing policy for the company. Five appointments have been announced in the company's Apparatus Dept., as follows: **Earl S. Henningsen**, manager of engineering; **B. H. Caldwell, Jr.**, Asst. manager of engineering and **D. E. Brainard**, **Howard D. Snively**, **Robert V. Sheppard** and **Robert Wieseman**, Division Engineers.

Autocraft Mfg. Corp.—**D. W. Johnston** has been made Vice-President in charge of sales.

The B. F. Goodrich Co., Industrial Products Sales Dept.—**Chester F. Conner**, Manager, has retired.

American Brake Shoe Co.—**Maurice N. Trainer** has been elected President and **William B. Given, Jr.**, Chairman of the Board.

Goodyear Tire & Rubber Co.—The appointment of **E. M. Eickman** to the newly created post of asst. manager of the Aviation Products Div., has been announced.

Vulcan Rubber Products, Inc.—The announcement of the appointment of **Thomas H. McConnell, Jr.**, as Sales Promotion and Advertising Manager has been announced.

H. K. Porter Co., Inc.—The appointment of **Henry M. Sossaman**, as General Manager of the Quaker Rubber Corp., Division of the company, has been announced.

E. W. Bliss Co.—**M. R. Hatch** has been appointed Chief Engineer of the Press Div.

Laminated Shim Co., Inc.—**Richard Seipt** has been made Vice-President and General Manager; **Merle L. Lockwood** appointed Vice President in charge of Sales to succeed Mr. Seipt and **Michael E. Errico** appointed Sales Manager.

Aluminum Co. of America—**Alfred M. Hunt** has been promoted to the position of assistant secretary.

E. I. du Pont de Nemours & Co., Inc.—**Milton A. Dewey**, until recently in the petroleum chemicals research and sales department has been made head of a newly created tetraethyl lead sales dept. in Canadian Industries Limited, a du Pont subsidiary.

Robinson Aviation, Inc.—The appointment of **G. deFreest Lerner** as General Manager, has been announced.

Samuel Moore and Company—**Bradford Burnham** has been appointed manager of the Government Contract Dept. Hydraulic Equipment Co. — **S. R. Marshall** has been appointed Director of Purchases.

Curtiss-Wright Corp.—**Fred J. Knerr** has been appointed to the newly created position of Manager, Material and Engineering Change Control. **George W. Wunner** has been appointed manager, Sales and Installation Engineering Dept., Propeller Div.

Thermoid Co.—**George W. Lamson**, Manager Automotive Replacement Div. has been elected Vice-President.

Vokar Corp.—**Lloyd B. Poole** has been appointed General Sales Manager.

Bell & Howell Co.—Announcement has been made regarding **Allen M. Adams**, who has joined the company as Director of Purchases.

Cutler-Hammer, Inc.—**R. A. Haworth** has been appointed manager of the Dallas district Sales Office.

CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

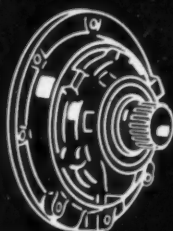
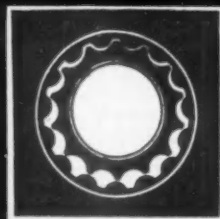
Paris Automotive Show, Paris...Oct. 5-15
Industrial Pkging. & Materials Handling Expos., Phila.....Oct. 10-12
SAE Nat'l Transportation Mtg., New York City.....Oct. 16-18
Nat'l Safety Congress, Chicago...Oct. 16-20
Society of the Plastics Industry Nat'l Conference, Swampscott, Mass. Oct. 18-20
British Passenger Car Show, London, Oct. 18-28
Amer. Society for Metals' Annual Nat'l Metal Congress & Exhibition, Chicago.....Oct. 23-27
Amer. Welding Soc. Annual Mtg., Chicago.....Oct. 23-27
Nat'l Lub. Grease Inst., Chicago, Oct. 30-Nov. 1
Amer. Soc. Body Engrs. Technical Convention, Detroit.....Nov. 1-3
Ind. Management Soc. Management Clinic, Chicago.....Nov. 2-3
American Petroleum Institute Annual Mtg., Los Angeles.....Nov. 13-16
1st Annual "Motorama," Los Angeles.....Nov. 16-19
Power & Mech. Engineering Exposition, New York City.....Nov. 27-Dec. 2
Nat'l Standard Parts Assoc. Convention, Chicago.....Dec. 1-2
Auto. Service Industries Show, Chicago.....Dec. 4-8
Nat'l Assoc. Engine & Boat Mfrs. Nat'l Motor Boat Show, New York City.....Jan. 12-20
Plant Maint. Show & Conf., Cleveland.....Jan. 15-18
Soc. of Plastic Engrs., New York City.....Jan. 18-20
4th Annual Hot Rod and Motor Sports Show, Los Angeles.....Jan. 25-28
Nat'l Auto. Accessory Mfrs. Assoc., New York.....Feb. 5-8
International Auto Salon, Geneva Mar. 8-18
Amer. Soc. Tool Engrs., New York City.....Mar. 17
Pacific Automotive Show, Seattle Mar. 21-24
Amer. Soc. Lubricating Engrs., Phila.....Apr. 16-18
Amer. Mgt. Assoc., Nat'l Packaging Expos., Atlantic City.....Apr. 17-20
A.E.R.A. Convention, Chicago.....May 7-9
Nat'l Air Races, Cleveland Airport May 19-20
Amer. Society for Quality Control, Cleveland.....May 23-24

Necrology

Donald Matthew Spaidal, 78, former executive vice president, General Motor Acceptance Corp., died on Sept. 18 in Gananoque, Ont., Canada.

EATON ROTOR PUMPS

*for Hydraulic Transmissions
Provide Silent Operation,
High Efficiency*



FRONT



REAR

Specialized Facilities
for the Large Scale Production
of Around-the-Shaft Transmission Pumps



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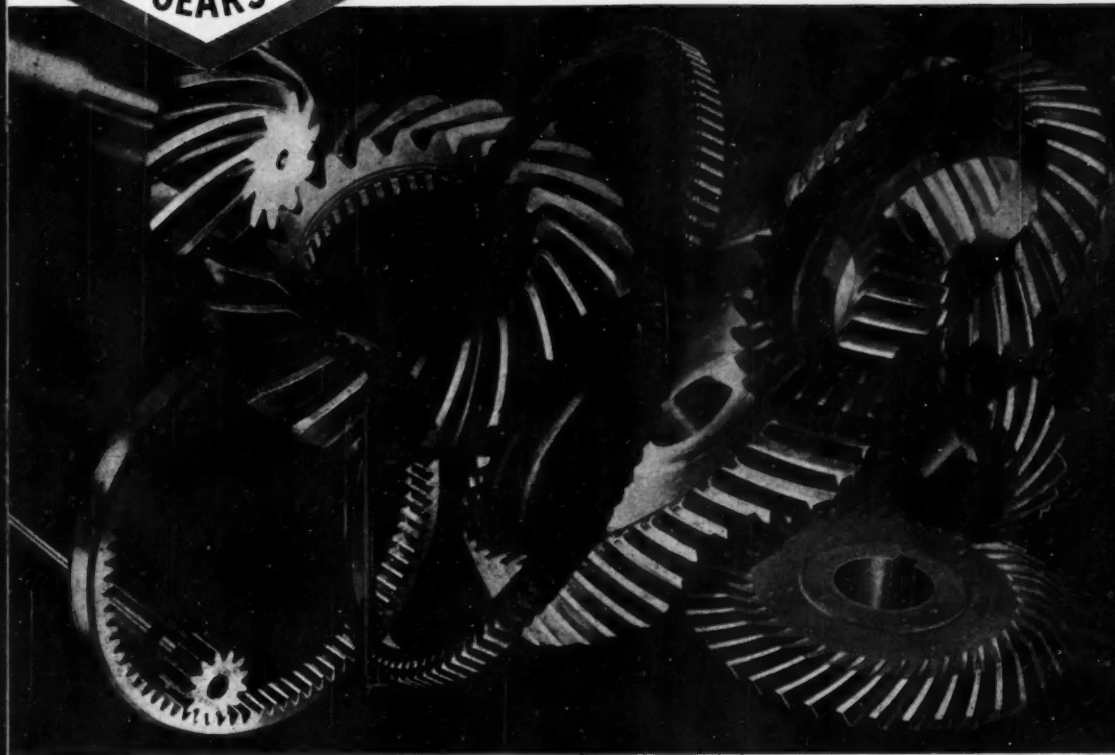
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INSOFAR as perfection is humanly possible you have a right to demand perfection of the gears you buy. You want to buy them—install them—and forget them. You want gears that relieve you of the headaches of assembly, replacement, and customer dissatisfaction.

No gear manufacturer should make blue-sky promises on this score. The best-made

gears will fail under certain circumstances and abuses. But you can surely minimize such troubles by selecting gears notable for their reliable performance.

"Double Diamonds" are gears of that character. They are built to produce low installed cost—to serve economically and dependably on the job for which you buy them—and to do credit to your product

and your reputation. Scores of America's leading companies specify "Double Diamonds" for these reasons—and have come to regard Automotive Gear Works as their "gear department" both in design and manufacture.

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RICHMOND, INDIANA

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FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS.....

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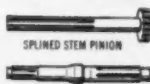
STRAIGHT BEVEL



STRAIGHT SPUR



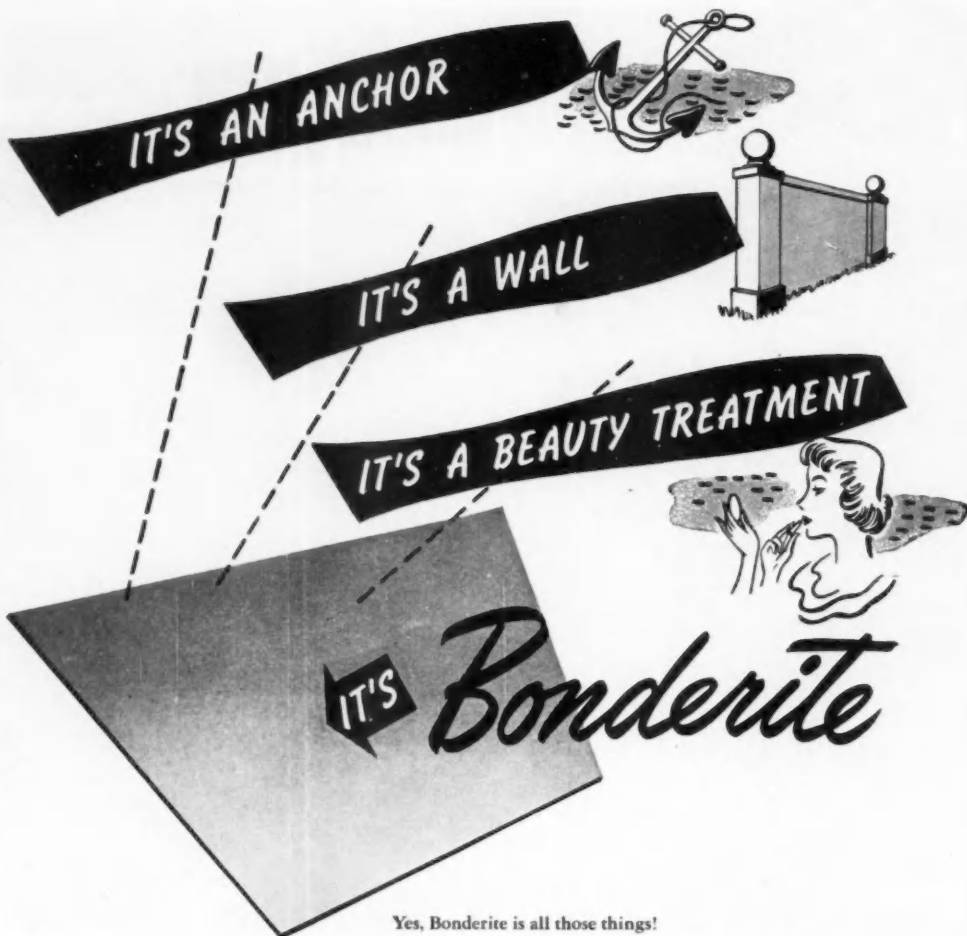
HELICAL SPUR



SPLINED STEM PINION



SPLINE SHAFT



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Yes, Bonderite is all those things!

It's an *anchor* for the paint. Paint or enamel applied over Bonderite has a secure foothold. It stoutly resists peeling and flaking.

It's a *wall*, resisting the attacks of moisture and corrosive forces. The Bonderite coating is a nonmetallic, insoluble coating integral with the surface of the metal itself.

It's a *beauty treatment*! Bonderite, under the paint, acts to preserve and protect the appearance of the finish through long service.

It is used by manufacturers who want lasting fine finish on metal. Most automobiles are treated with Bonderite. So are the great majority of refrigerators, washers and other domestic appliances. It is a product improvement used on hundreds of metal products as a corrosion-resistant paint base.

Bonderite is a *sales-feature*, too. Buyers know and appreciate the value of this paint-holding process.

Bonderite, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

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BONDERITE—Corrosion Resistant Paint Base • PARCO COMPOUND—Rust Resistant • PARCO LUBRITE—Wear Resistant for Friction Surfaces

WE INCREASED PRODUCTION 71% WITH J&L "E" STEEL

J&L STEEL



(a story* about how to win customers and influence prospects)

"Got a minute? Well, let me tell you about what happened at our machine shop a couple of months ago when we first tried that new J&L "E" Steel. You wouldn't believe it was possible! (Confidentially, neither did we until we proved it to ourselves.) Here's what happened.



"We got an order to produce a big lot of plunger stops for solenoid starter switches. They're tricky to run, and you've got to be pretty careful every second. We'd read about "E" Steel in some of J&L's ads, and decided we might try some on this job.

"So we ordered some 17 32" E-33 "E" Steel stock, set up our B&S #2 and B&S #0 Automatics and began to turn out parts. We had used B-1113 for this job before and had been getting 350 pieces per hour. But we soon realized we could machine much faster with "E" Steel, and we kept increasing speed until we were getting an average of 600 parts per hour. That's a 71%



production increase!

"Next thing we discovered was that our tools were lasting twice as long; and the chips were coming off better with "E" Steel than they did with B-1113. We also found that the finish on the parts had improved from 20% to 25%.

"That's why we've been using "E" Steel. We turn out work much faster and can take on more jobs. Our men like the way "E" Steel machines and our customers get better parts and better service. Everybody benefits!"

Get your copy of the booklet titled "A Progress Report on 'E' Steel." It outlines a series of 11 case histories from machine shops that have used "E" Steel with excellent results. Write for your copy.



* Based on an actual case history.

"E" Steel (U.S. Pat. No. 2,484,231) is easily identified by the distinctive blue color on the end of every bar.

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLO and JALLOY (hi-tensile steels).

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

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Thorough degreasing in the most modern equipment is just one of the "details" carefully attended to at Accurate.

lowers the overall cost of your springs

THE manufacture of springs, like the manufacture of your product, is the sum of details . . . and the attention *each* of these details receives determines the quality of the finished product. Here at Accurate, we feel that no detail is too minor to receive the careful attention of our skilled springmakers. The result: precision springs that exactly meet your specifications and do their part in assuring the fine performance your product was designed to give . . . and because of the rigid adherence to your specifications assembly is speeded up, inspections simplified and rejections minimized. This means substantially lower overall costs for you.

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Write for your copy of the new revised Accurate Handbook of Technical Data on Springs. This booklet has been out of print for some time and if you have previously requested a copy and have not received it, we would appreciate your asking again.



*Be sure the
springs you
buy are
Accurate*

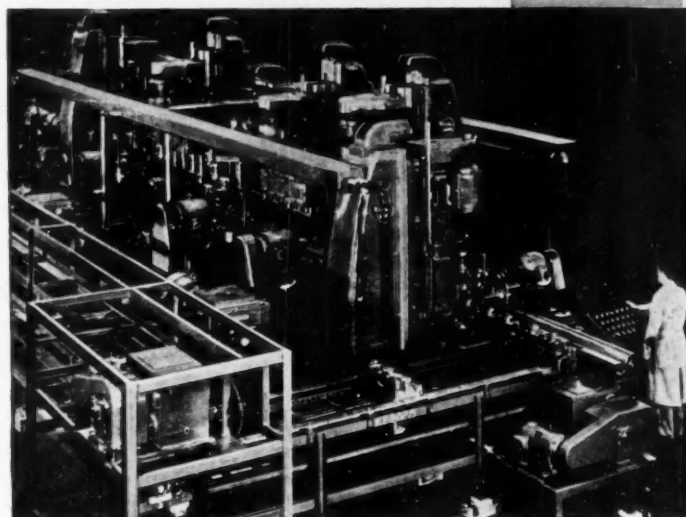
*Accurate
Springs*

*Springs
Wire Forms
Stampings*

**How 116 OPERATIONS ON
REFRIGERATOR COMPRESSOR FRAMES
ARE**

Completed automatically

**on BARNES 24-station
PROGRESS-THRU MACHINE**



DUAL WORKPIECE FIXTURE

Fixture holds two workpieces. Right side is shown open. Note cavity provided for chip disposal. Angular hole in each position serves as guide for blind drilling of bottom oil pump hole. Two elevating dowel pins locate fixture accurately in each working station.

● Here's another example of how special machines by W. F. & John Barnes effect substantial savings in work handling and machining costs. To meet production needs, two compressor frames are machined simultaneously in each station. For accurate positioning, flanges are first turned and faced and oil intake face broached, in prior operations. The remaining machining operations, a total of 116, are then performed automatically in a continuous 40-second cycle. A total of 260 parts are completed per hour, at 100% efficiency.

Pivot-Spindle Heads Drill and Bore Oil Holes Parallel to Line of Transfer

Of special interest are the two pivoting heads in stations 20 and 21 which drill and counter-bore oil regulator holes in a plane parallel to the line of transfer. Spindles pivot into position against positive holding stops. Hydraulically operated saddles then feed the tools in a cycle of feed, dwell, and rapid return. The procedure eliminates secondary operations.



SEQUENCE OF AUTOMATIC CYCLE

Sta.	L. H. Heads	R. H. Heads
1	LOAD DURING WORK CYCLE	
2	Idle.	Idle.
3	Mill 2 faces, muffle box.	Comb. drill & chamfer 4-No. 8-36 tap, oil intake face.
4	Idle.	Idle.
5	{ Drill 2-1.053" 1/2 depth, cyl. hole.	{ Comb. rough bore 2-.596" & 2-1.440" boring & shaft holes.
6		
7	Idle.	Idle.
8	{ Comb. rough bore & face 2-1.093" cyl. holes & muffle box face.	{ Spotface 2-1/2" flange holes.
9	{ Comb. groove & back chamfer 2 cyl. holes, feed-out tool.	
10	Idle.	Idle.
11	Idle.	Comb. semi-finish bore 2-.613" & 2-1.458" boring & shaft holes.
12	Semi-finish bore 2-1.113" cyl. holes.	Idle.
13	Idle.	{ Comb. tap on bore & chamfer 2 shaft thrust faces.
14	{ Drill 2-1/4-20 tap, muffle box.	{ Comb. c.bore & chamfer 2 shaft holes.
15		
16	Idle.	Tap 4-No. 8-36 oil intake.
17	{ Comb. feed-out face & chamfer 2 thrust faces & cut snap ring grooves.	{ Drill 2-1/4" oil intake holes 1/2" depth.
18		
19	Idle.	Drill 2-3/4" bottom oil pump holes.
20	{ Drill 2-.476" oil regulator holes.	{ Idle.
21		
22-23	Idle.	Comb. c.bore & chamfer 2-.740" oil pump holes.
24	UNLOAD DURING WORK CYCLE	
	NOTE: Straddle station units are shown in brackets.	



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Head-on view of the two-door sedan model.

Kaiser "Supersonic" Engines 1951 Henry J. Models

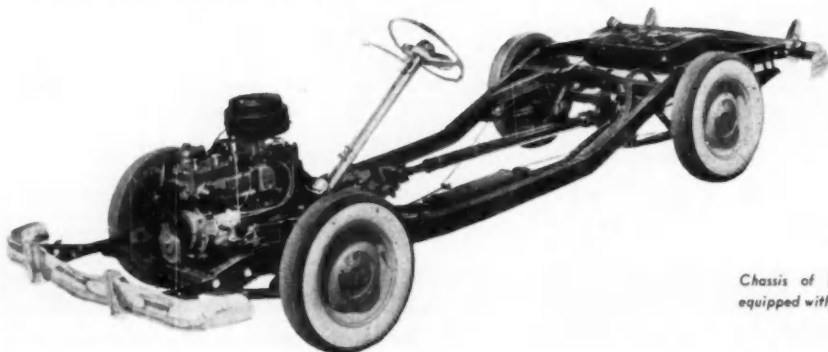
	Four	Six
Type.....	L-head	L-head
No. cyl.....	4	6
Bore (in.).....	3 $\frac{1}{8}$	3 $\frac{1}{8}$
Stroke (in.).....	4 $\frac{3}{4}$	3 $\frac{1}{2}$
Displacement (cu in.)....	134.2	161
Compression ratio.....	7 to 1	7 to 1
Bhp (max).....	68 @ 4000 rpm	80 @ 3800 rpm
Torque (max) lb ft.....	109 @ 1800 rpm	133 @ 1600 rpm
No. main bearings.....	3	4

FOLLOWING the initial showing of the Henry J in Chicago early this year, Kaiser-Frazer Corp. now has released the details of its new car. As illustrated, the Henry J is offered as a two-door model with gener-

Details the

ous space for passengers and luggage. It will be available with either a four or six-cylinder Kaiser "Supersonic" engine, both engines being of L-head type. The two-door model has been in production prior to this announcement to allow sampling of dealers without delay. A two-door convertible model will be added to the line later on.

With a wheelbase of 100 in., the car has an overall length of 174 $\frac{1}{2}$ in., maximum width of 70 in., and overall height of only 59 $\frac{1}{4}$ in. Ground clearance is 7 $\frac{3}{4}$ in. The tread is 54-in. front



Chassis of Henry J Car equipped with six-cyl engine.

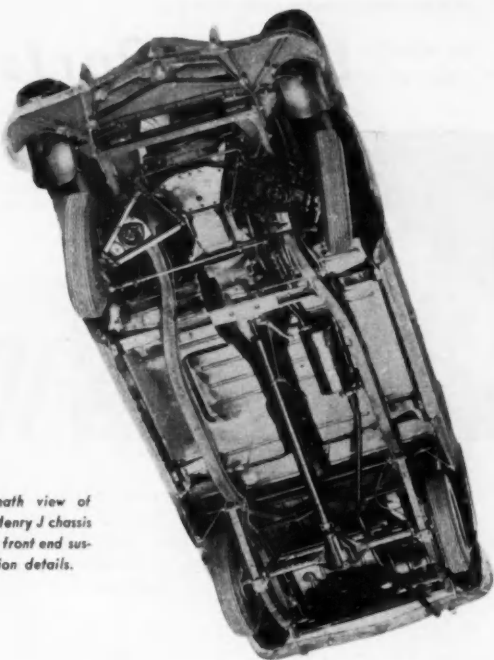
and rear. Unusual leg room is provided at the front where it amounts to 42 in. Headroom is 37½ in. front and 35 in. rear. Easy entry and exit is facilitated with 57-in. doors.

Special features include fuel economy expectancy of around 30 mpg, low cost replacement parts, and low upkeep. Another important economy feature is the fact that all fenders are bolted on, thus making replacement a simple matter in event of collision damage.

An interesting production feature of this car is the single roof panel extending from the cowl down to the rear edge of the body, eliminating the usual trunk lid. Luggage is loaded from the interior of the car, load-

of HENRY J

Underneath view of six-cyl Henry J chassis showing front end suspension details.



ing being facilitated by the wide door opening. Where cargo capacity is important, the rear seat is arranged to fold forward to become a part of the trunk floor. This provides luggage capacity of 50.3 cu ft. With the rear seat left in conventional position, luggage capacity is 19 cu ft.

Coming to the basic mechanical details of the car, it is noteworthy that the customer has an option of either a four or six-cylinder L-head engine, both engines being supplied to K-F by Willys-Overland but built to K-F specifications. Major specifications of these engines are given in the appended table.

A feature of Kaiser engines is positive crankcase

ventilation, air being taken through the air cleaner and exhausted into the intake manifold. Both engines have unusual smoothness with the use of fully counterweighted crankshafts. The Four has four counterweights; the Six, seven counterweights.

Both engines are fitted with the 1½ in. Carter YF downdraft carburetor. Auto-Lite 14 mm spark plugs are used. The clutch is an 8½ in. Borg & Beck. Both AC and Carter fuel pumps have been approved and will be supplied in conventional and booster types as specified. The Carter booster type fuel pump has been released for initial production.

(Turn to page 97, please)

Side view of Henry J Car.



Large Parts and Equipment DIESEL

By Thomas Mac New



W

IDE acceptance by the railroads of Diesel-electric power for locomotion has been one of the greatest economic developments in the Diesel engine field in recent years.

Just a decade ago, the Class 1 railroads had 50 steam locomotives in service for every one Diesel-electric unit, but by the end of 1949 this ratio was only three to one. Data demonstrating the increased use of Diesel locomotives by the nation's Class 1 railroads from 1940 through 1949, given in three categories—locomotives in service, new locomotives installed in service, and locomotives permanently retired—are presented in Table 1.

Figures representing a breakdown, by services, of the new locomotives installed by the railways during 1949 are given here as follows:

Type of Service	Steam	Diesel-electric
Passenger	9	262
Freight	54	1,438
Passenger and freight	0	75
Switching	3	999
Total	57	2,774

This outstanding trend toward total railway Dieselization in the past decade is also illustrated by Fig. 1, in which the proportionate use of Diesel power in 1949 is compared with that of previous years. Diesel utilization in each of the three services—passenger, freight, and yard—has increased steadily since 1940. According to figures released by the Interstate Commerce Commission, nearly one-half of total car-miles in passenger service, more than one-third of the gross ton-miles of cars in freight service, and approximately one-half of the locomotive-hours in switching service were accounted for by Diesel-electric power in 1949. The trend is further emphasized by the fact that more Diesel units were delivered during the first eight months

of 1950 than the Class 1 railroads had in service at the end of 1940. During that time, the railroads ordered well over 1000 Diesel-electric units, and it has been estimated that the manufacturers have a large enough backlog of orders to keep them busy for the next five years.

In order to meet this demand, the manufacturers are in mass production and have standardized their lines. Electro-Motive Division of General Motors Corp., for example, has a current production schedule of 200 locomotive units per month. As for standardization, the railroads go along more or less at the insistence

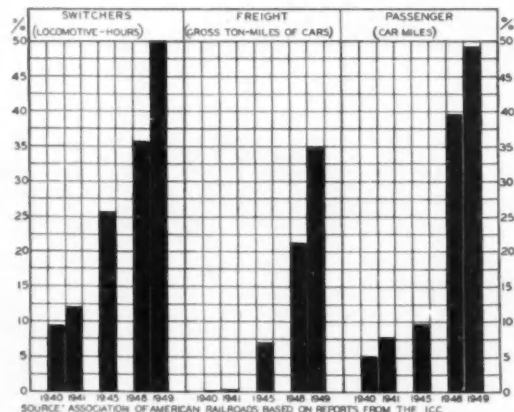


Fig. 1—This graph shows the increased use of Diesel-electric utilization expressed as a per cent of the total service of all types of locomotives for respective years.

Market for LOCOMOTIVES

MAJOR OVERHAUL PERIODS OF DIESEL LOCOMOTIVE ENGINES

Type of Service	Miles	Years
Passenger	1,000,000	5
Freight	500,000 to 750,000	5 to 6
Switcher	5 to 10

of the builders. The makers would rather maintain mass production of a standard unit than custom build locomotives according to a particular railroad's design.

Sales of Diesel-electrics will probably be given another boost by insurance companies that are willing to purchase locomotives from the manufacturer and lease them to the railroads. One insurance company has a plan whereby it pays the builder a 90 per cent down payment and agrees to pay off the balance in equal installments out of rentals for a five-year period. The railway can lease the locomotive for 15 years with the option of either returning it or continuing to lease it for an additional period up to 10 years. Just recently Equitable Life Assurance Co. announced its first Diesel-electric lease arrangement with the rental of 38 Diesels to the Baltimore and Ohio Railroad. They will be built by the Baldwin Locomotive works.

One of the most significant outcomes of railway Dieselization is the large-scale manner in which the Diesel-electric locomotive builders have entered the replacement parts and service market. The replacement parts business is growing very rapidly, and manufacturers estimate that sales for all locomotive parts should reach 30 to 40 million dollars this year. Firms which previously produced parts for steamers are now quizzing the railroads in order to ascertain what Diesel parts are needed most. One long-time producer of steam engine parts is going to manufacture a supercharger for a well-known Diesel engine.

Unlike steam locomotive practice, the railroads do



Illustrated here is a vee type 12 cyl American Locomotive Co. Diesel engine being lowered into the framework of a new Alco-GE Diesel-electric locomotive. Alco, which produced 779 Diesel-electric locomotives during 1949, has been producing this type exclusively for the past two years. The company has disposed of all steam manufacturing facilities.

not intend to manufacture parts in their shops since Diesel engine parts are not only more difficult to build but the capital outlay for production equipment would not be economically feasible, according to a survey among railway executives. They state that maintenance tools rather than production tools are the order of the day, and the emphasis is on the larger maintenance tools such as crankshaft grinders. Table 2 gives a partial list of tools used by the railroads for Diesel engine repairs.

Some locomotive makers have worked out formulae for the number and types of replacement parts which a railroad should purchase based upon the number of

TABLE 1
CENSUS OF LOCOMOTIVES*
CLASS I RAILROADS IN UNITED STATES

Locomotives in Service as of End of Year	1940	1941	1945	1948	1949
Steam locomotives	40,041	39,624	38,853	32,914	26,964
Electric locomotive units	858	857	842	829	817
Diesel-electric locomotive units	797	1,267	3,816	8,089	10,888
Other	25	23	19	19	22
Total	41,721	41,771	43,530	41,851	40,691
New Locomotives Installed in Service					
Steam locomotives	120	157	115	86	57
Electric locomotive units	20	6	0	8	0
Diesel-electric locomotive units	281	469	786	2,254	2,774
Other			0	2	0
Total	421	632	901	2,350	2,831
Locomotives Permanently Retired					
Steam locomotives	1,247	705	1,048	2,353	4,074
Electric locomotive units	5	8	19	18	12
Diesel-electric locomotive units	8	5	43	4	12
Others			0	2	1
Total	1,260	718	1,110	2,377	4,099

* Source: Interstate Commerce Commission.

locomotives in given services. There are, however, some railroads that prefer to derive their own basis for purchasing replacement parts in order to suit requirements of particular operations.

In connection with spare parts policy, some railway officials are advocating dimensional standardization of certain accessories—oil, fuel, and air filters—by the locomotive manufacturers so that those accessories can be interchanged between different makes and type of locomotives.

Very few railways purchase spare engines with an order for a certain number of locomotives since it is so seldom that an engine has to be removed for repair that it would be uneconomical for a railway to invest in engines which would not be in service. Railroads that operate a considerable number of Diesel-electric units, however, might stock a spare engine or two just to meet emergencies. Actually, the Diesel engines operate a good many miles or years before they require a major overhaul, as noted in table at top of page 35.

Replacement parts and service depots have been established by the Diesel builders in much the same manner as the bus and truck makers have set up their depots. An exemplification of this is the procedure used by Electro-Motive Division of GM and by the Baldwin Locomotive Works.

Electro-Motive has a large central warehouse at its main plant in LaGrange, Ill., which feeds six parts depots located at Minneapolis, Baltimore, Jacksonville, Los Angeles, Oakland, and St. Louis. Baldwin uses a similar setup in which six district parts warehouses

DIESEL LOCOMOTIV

located at Chicago, Minneapolis, St. Louis, Atlanta, Houston, and San Francisco are supplied by the main plant in Eddystone, Pa. These depots are supplied with all but the slowest moving of the many thousands of parts that are regularly stocked. Parts having a low turnover rate are stored only at the main warehouses. In addition to individual parts, each depot has factory-rebuilt assemblies that are available on a unit exchange basis.

The policy of the builders is to attempt to have most replacement parts not more than 24 hours away by rail from any locomotive in use. Due to standardization of locomotives, the manufacturer is able to

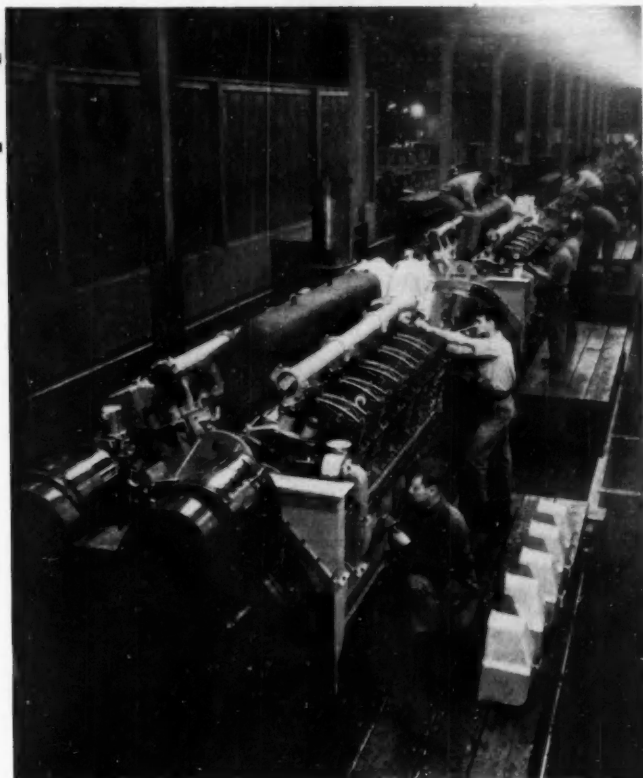
economically carry the real load of investment in replacement parts.

Electro-Motive does not have any service depots as such, but instead has service engineers who operate from their homes at some 30 different locations. Similar to the parts depots, these locations are selected so the engineer will have ready access to any customer having unusual difficulties. No mechanical assistance is supplied to the railroads, since the service department is only an adviser and instructor in the proper operation, maintenance, and repair of GM locomotives.

Like the trend in Diesel-electric locomotives and parts sales, the demand for increased power in a single engine has grown continuously since the first Diesel road locomotive was installed in service. Even though

TOOLS AND

- 1.—Arbor presses
- 2.—Crankshaft grinders
- 3.—Dies
- 4.—Drill presses
- 5.—Electric grinders
- 6.—Engine lathes (medium and large)



V-12 Diesel power plants on the assembly line at American Locomotive Works.

the Diesel units of today employ engines having maximum ratings up to 2000 hp, the railroads want an even greater output. This trend towards a greater concentration of power in a single engine will probably continue and it is reasonable to believe that with more power will come higher engine speeds, increased power-weight ratio, and improved efficiency.

It is of interest to note here that although the num-

ber of Diesel-electric units in service and their power output have been steadily increasing, average tractive effort has remained relatively constant over the past 10 years.

Some industrialists have stated that the railroads will be totally Dieselized by 1955, and considering current production and sales that goal might be possible, barring curtailment of production due to a war economy. Most railway executives, however, believe that 100 per cent Dieselization will take at least 10 to 15 years since there are several factors to be considered which may prevent the railroads from going all out for Diesels in the next five years.

Major coal hauling roads might take a long time to become totally Dieselized; approximately 500 million tons of coal and coke are hauled annually by the railroads. Of course, besides hauling coal, they purchase great quantities for use in their steam locomotives—although purchases have declined from 115 million tons in 1945 to 88 million tons in 1948 and are still going lower. Whether or not the development of the coal-fired gas turbine, which the coal interests have been working on, will in time stem the decline in coal purchases and affect the per cent of Dieselization remains to be seen.

(Turn to page 90, please)

TABLE 2
EQUIPMENT USED BY RAILROADS FOR DIESEL ENGINE REPAIR

- | | | |
|---|--|---------------------------------|
| 7.—Hack saws (power driven) | 12.—Measuring instruments such as inside and outside micrometers | 16.—Taps |
| 8.—Hand tools (large wrenches, etc.) | 13.—Portable boring bars | 17.—Universal milling machines |
| 9.—Hoists | 14.—Portable power tools (electric and pneumatic) | 18.—Valve grinding equipment |
| 10.—Honing machines | 15.—Reamers | 19.—Valve seat facing equipment |
| 11.—Inspection equipment for detecting flaws in metal parts | | 20.—Welding equipment |



By Robert McLaren

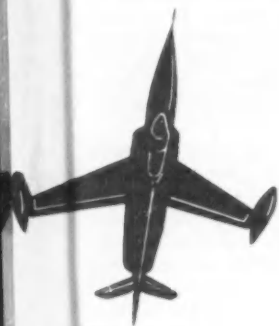
THE first wave of "boom fever" has passed in the aircraft manufacturing industry, tens of thousands of overtime-hungry unskilled workers have been turned away from employment offices and the scope of current requirements is now clear. There is now no doubt that the industry can accommodate the new program well within its capacity, without elaborate training programs for new workers and without overtime payments except in isolated departments. Briefly, the Korean crisis has brought only a mild step-up in aircraft production rates.

The major increase in aircraft production requirements has come principally due to the decision to increase the United States Air Force to 69 Groups, from its present 48, to expand Naval Aviation and to provide a substantial quantity of combat aircraft for European nations under the Mutual Defense Assistance Program, all of which is related only indirectly to the Korean situation.

The reason the industry is viewing the new program calmly is that it has not the characteristics of a mobilization against time, such as would be demanded in a national emergency. It is this kind of hysteria-ridden program that the industry dreads, that requires fabulous expenditures and inevitably produces the material shortages, program changes and similar headaches of a wartime expansion. It now appears that none of these are contained in the current program.

Godsend for the industry has been final formalization of a long-range aircraft procurement program by the Department of National Defense. The industry has plead for such a program for five years so that it could plan intelligently with its future requirements clearly established. Although it is true that an international crisis can at any future time skyrocket these requirements, the industry is not nearly so interested in the maximum volume that it may be called upon to produce as it is the expected minimum level at which it can plan. This is now clearly delineated for both branches of the service and the current expansion of the industry, modest though it is, is proceeding against a long-term program rather than a short-time hump to meet the needs of the war in Korea.

One of the important facts for the industry, and for the citizens of the nation, is that the Air Force top command has not taken its eye off the main target of an all-out war with Russia at some future date. This reassuring decision is evidenced by the composition of the new 69-Group program, which shows no heavy shift to tactical air power



Aircraft Industry Boom Under Way

but, instead, an increased emphasis on intercontinental bomber groups as well as strategic cargo aircraft. Ill-considered demands for re-installation of production lines on the North American F-51 Mustang and Vought F4U Corsair (actually still in production but not scheduled for any expansion) were quickly brushed off by the Pentagon. As this is written, latest reports from Korea indicate that the United Nations forces have all the tactical air power they need under present conditions and no additional propeller-driven aircraft are being ordered to that area. Thus, the new aircraft procurement program cannot be considered in any way an answer to the demands of the war in Korea. Rather it results from the decision of the President and the Congress to increase the size of this nation's air forces and to provide a substantial quantity of aircraft to European nations.

The new program shapes up, roughly, as a triple expansion of output by this time next year. The industry is currently producing about 250 military aircraft a month and this rate must be upped to around 650 aircraft a month by July, 1951, if current programming is to be satisfied. The original fiscal 1951 procurement program asked for 1460 USAF aircraft worth \$1.5 billion and 912 Navy aircraft cost \$0.7 billion, or 2372 aircraft at about \$2.2 billion. The new Defense Production Act (President Truman's \$10 billion for Korea) asks for an additional 2500 aircraft costing \$2.7 billion for the Air Force and about 1250 Naval aircraft costing \$1.6 billion. As an afterthought, the President then asked for a further increase of \$0.9 billion for about 750 more Naval air-

craft. This is a total of roughly 4000 Air Force and 2000 Navy aircraft currently to be procured at an expenditure of \$6.6 billion.

The new arms aid for Europe bill has not yet been totalled but it will likely run somewhat between \$0.8 and \$1.0 billion for new aircraft procurement. The reason this program is important, and that it must be considered an integral part of the current procurement picture is that the European nations long ago indicated they were not interested in any second-hand U. S. aircraft, which is precisely what the Pentagon was preparing to offer. England's jet fighters are not only as good as our own but, in rate-of-climb, are distinctly superior. France has produced some interesting prototype jet aircraft, which she is placing in production shortly. The smaller countries have purchased substantial quantities of British jet fighters, notably the DeHavilland Vampire, giving them the same

(Turn to page 76, please)

CURRENT AIRCRAFT PROCUREMENT PROGRAM

Air Force		
Fiscal 1951 Appropriation	\$1,565,106,708	
1950 Defense Production Act	2,777,300,000	\$4,342,406,708
Naval Aviation		
Fiscal 1951 Appropriation	\$ 733,827,855	
1950 Defense Production Act	846,269,000	
Supplemental Appropriation	250,000,000	2,329,896,855
Mutual Defense Assistance Program		
Fiscal 1951 Appropriation	\$ 150,000,000 (est.)	
Supplemental Appropriation	700,000,000 (est.)	850,000,000
Grand Total		\$7,522,303,563

LONG RANGE AIRCRAFT PROCUREMENT PROGRAM

Year	Air Force	Navy	Total
1951	\$4,222,000,000	\$2,200,000,000	\$6,422,000,000
1952	2,500,000,000	1,800,000,000	4,300,000,000
1953	1,200,000,000	1,500,000,000	2,700,000,000
1954	2,000,000,000	1,500,000,000	3,500,000,000
Subs.	2,800,000,000	1,500,000,000	4,300,000,000



(Above) Exterior design changes for 1951 include a restyled front end and elongated rear fenders that form streamlined vertical fins.

(Circle) Tail and directional signal lamps now are located on the rear fenders instead of on the trunk lid. Guards on the wrap-around fenders are heavier than on previous models.

Nash

IN ITS 1951 Airflyte lines Nash Motors offers the Ambassador, Statesman, and the low-priced Rambler introduced earlier this year (see AUTOMOTIVE INDUSTRIES, April 15). The first models to be announced—Ambassador and Statesman sedans and club coupes—will sell in the low-medium and medium price classes. From the standpoint of exterior styling the major change is found in the front end and grille treatment; and the introduction of elongated rear fenders, forming streamlined rear fins. Rear fenders accentuate an appearance of greater length with a horizontal line from the front fender to the upper tip of the rear fender.

Engines remain unchanged in basic specifications but include important new details to be described later. Mechanically the 1951 models stress changes designed to improve riding comfort and performance.

Hydra-Matic transmission, formerly offered only with Ambassador models, is now available as optional equipment in the Statesman series. Both cars also are offered with a choice of fourth-speed overdrive as op-

tional equipment or may be had with conventional manual three-speed gear shifts.

Airflyte construction with single unit body and frame for extra strength, torsional rigidity and quietness continues as an outstanding Nash feature. Soundproofing and insulation are scientifically applied in the new models to further minimize noise from engine, drive shaft and road.

Custom models retain dignity and luxury with interiors utilizing 11 new combinations of needlepoint upholsteries and vinyl trim and moldings in harmonizing choices. Included on custom models are: Gray base and black diamond combinations with black, rust, green and blue needlepoint. The cushioned and upholstered front door arm rests are notched to serve as door pulls. Floors are covered with deep pile carpets. The carpeted rear passenger foot rest is counter-sunk into the backrest of the front seat.

The instrument panel is entirely new, having the instruments clustered on the panel in conventional fashion with a suitable shroud over the speedometer to prevent light reflections. The panel now has rounded lower edges for safety. A single massive steering column jacket encloses both steering post and gear shift linkage.

Detail improvements in the engines include the fol-

lowing features: On all three series, Neoprene-insulated wiring harness from the coil to the distributor, and from the distributor to the plugs. This has less tendency to crack with age and is waterproof. Statesman and Ambassador models also have a Neoprene cap over each spark plug, forming part of the insulation of the high tension lead and extending part way down the porcelain insulator. These engines also have Vinylite nipples on the distributor and coil.

A Carter YF carburetor replaces the former WAI on Rambler and Statesman engines. It retains the Uniflow jet principle but has a number of distinctive features. For example, the float bowl vent leads to a tube ending at the center of the main barrel just above the choke valve. The vent takes in clean air and is likely to remain cleaner. In addition, it compensates for changes in air-fuel ratio resulting from changing restriction in the air cleaner as well as the different pressure drop characteristics of standard and oil bath air cleaners.

The accelerator pump—unlike the usual plunger

pump—is of diaphragm type. The fast idle mechanism is in the choke housing, no longer exposed on the throttle shaft. The carburetor is of vacuum economizer type as before. The new accelerator pump arrangement, operated partly by vacuum, provides a somewhat leaner mixture for steady speed driving.

The Carter vacuum-operated fuel pump, introduced on the Rambler, will be found on all three lines (Hydra-Matic or overdrive equipped cars), the booster type model being supplied on Statesman and Ambassador engines. Nash has found this type of pump to be quieter than previous models. The mechanical type AC fuel pump will be used on Statesman and Ambassador models with standard three-speed transmissions.

A new type of starter drive has been adopted on Rambler and Statesman models. It stays in engagement on intermittent firing during cold starts.

Ambassador engines have an improved distributor drive with considerably less spark variation and less intermittent knock at low speeds. The drive has less play in the internal mechanism while the tongue-and-groove connector, formerly used, is re shaft.

Some interesting changes in the Ambassador overhead valve mechanism contribute to greater quietness, improved lubrication, and longer life. Redesign of the rocker arm has been made to provide controlled lubrication to the valve and arm. Clearance of the rocker arm and shaft has been increased to reduce noise. In addition, a new type of felt seal is provided on the upper end of all valve guides to control lubrication during idling and at engine starting. A synthetic rubber ring is mounted just above the felt as an oil shield as well as felt retainer. A small stamped collar holds the felt and rubber assembly firmly in place.

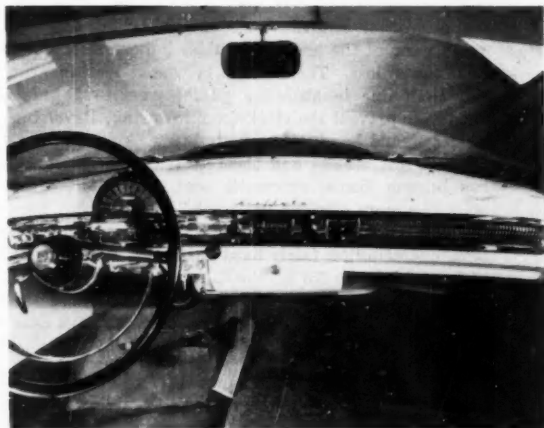
Controlled finish of valve stems has been developed to assure an increased amount of entrapped oil to resist scuffing and excessive wear.

On the Ambassador, crankcase ventilation has been improved by increasing air circulation at all driving speeds. This is effected by a redesigned breather tube which positions the breather outlet more favorably relative to air flow under the car. Similar changes have been made in

(Turn to page 96, please)

Announces

Improvements in Ambassador and Statesman Models



The new Nash instrument panel extends the full width of the front compartment. It includes major driving instruments and controls, radio, clock, ash tray, and radio grille in a single unit.

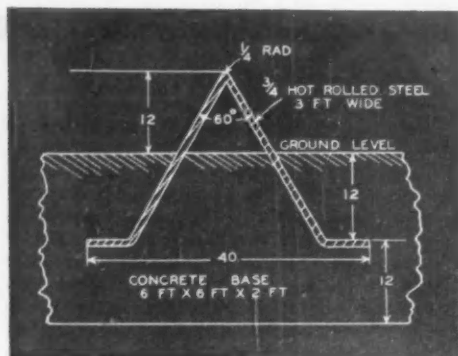
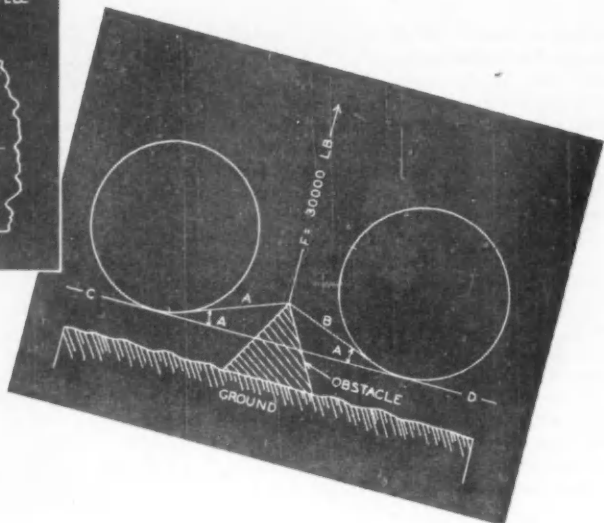


Fig. 1. (Above) Track testing obstacle.

Fig. 2. (Right) Condition when one side of a track-layer is supported on a single obstacle.



Design and Construction

THE need for transportation over a wide variety of terrain that impedes or totally hinders the passage of wheeled vehicles has brought forth a number of designs of vehicles which, in a sense, lay their own roads as they proceed. These ingenious modes of transportation, known as tractors or track-layers, operate either by friction, projecting grousers, or a combination of both, the track being "geared" to the soil.

In the design of tracks the generally accepted statement, "the thinner the track the greater its efficiency," is probably true, for various types of tracks are special forms of chains or belts with projections to give trac-

tion; and the nearer this traction is to the pitch line where the power is applied the greater is the efficiency, because the couple arm between the driving pull and the ground reaction is shorter. The distance between the track pitch line and the bogie wheel face of the track is usually less important, for the pull required to roll the bogie wheels over the track when it lies fairly flat is of the order of 25 lb per 1000 lb of weight with rubber tired bogies and rubber faced track.

The drag from the track guides rubbing against the bogie wheels is, however, very considerable. These are metal-to-metal contacts without lubrication, and the rapid wear of the hardened guides indicates considerable power loss. These contacts cannot remain near the pitch line because the guides have to be high enough to prevent the track from throwing. Revolving guides should be given more study.

From test results and theoretical considerations it has become almost axiomatic that, "the shorter the pitch the more efficient the track." This applies particularly to track layers of fairly high speed, 20 to 50 mph, operating on fairly hard surfaces. With pitches of from 3.5 in. to 6.0 in. the impact loading when the track shoes contact the ground is reduced and the angular movement per pin when the track moves over

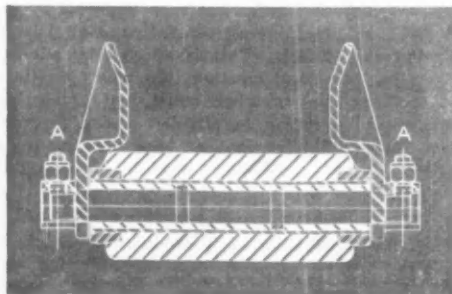


Fig. 3. One type of rubber-bushed track with weight supported at A-A.

the sprocket is less than with the longer pitches formerly employed. However, in soft ground, plate rocking with short pitches may absorb considerable power. The rock at the bogie wheels is frequently about plus and minus five deg with six in. pitch. There is also rocking on hard ground due to grouser design and location. This may be minimized by locating straight across grousers near the trailing edge of track plates, and by patterned grousers, or rubber contact pads as used on the Weasel. The shorter the pitch the heavier the track; and heavy tracks are expensive and absorb power. Track weights per ft of length of U. S. military vehicles vary from 15.2 lb per ft for the 600 lb M29C cargo carrier (Weasel) to 130 lb per ft for the 133,257 lb M 6 heavy tank.

Track parts must be designed for impact loads. If grousers lock on to immovable ledges the full low speed pull of the engine plus the inertia of revolving parts and of the track layer may be translated into track tension in a very short time. This time element determines the maximum tension. Rubber bushings for track pins cushion these shocks by permitting the track to stretch. This stretch may be 0.003 in. per

bushing per 1000 lb track tension in that portion of the track actually in tension from the impact. Catenary shapes and weights must be considered. Some types of spring suspension also reduce this kind of shock.

The total low gear drawbar pull provided is often about 75 per cent of the loaded weight of the vehicle. With this gearing a rubber-bushed track having a static test tensile strength per track, after 1000 miles of operation, of 1.75 times the loaded weight of the vehicle has proved fairly satisfactory, with maximum speeds of 20 mph on most terrains.

Certain operating conditions give very high track stresses. When tested in our western deserts, where good sized rocks, concealed by sagebrush, were often hit at high speed; and on the rocky mountains of Italy, army tank tracks and suspensions had very short life. When landing over coral reefs in high seas the tracks of amphibians were not strong enough. This illustrates the point that it is impossible to design tracks for all conditions. The Weasel tracks are satisfactory for most terrains.

When designing wheels, tracks, and suspensions for

of Tracks for Track-Laying Vehicles

This Exclusive Article Presents an
Analysis of the Problems Which
Must Be Solved in Making Strong,
Efficient, Economical Tracks for
Tanks as Well as for Other Track-
Laying Vehicles.

By
Frank E. Watts
Engineering Counsel

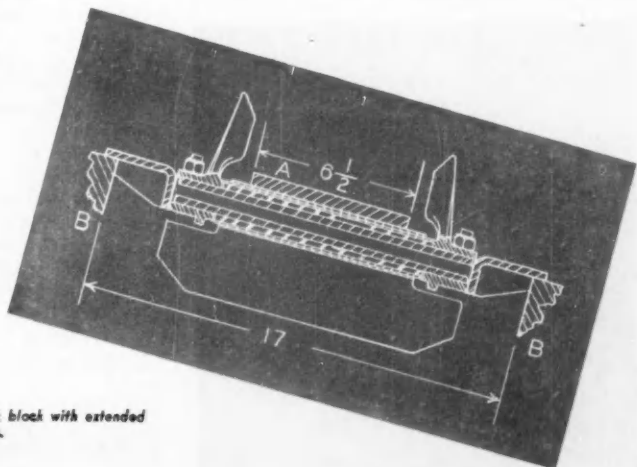


Fig. 4. Static test of L.V.T.-3 track block with extended and connectors.

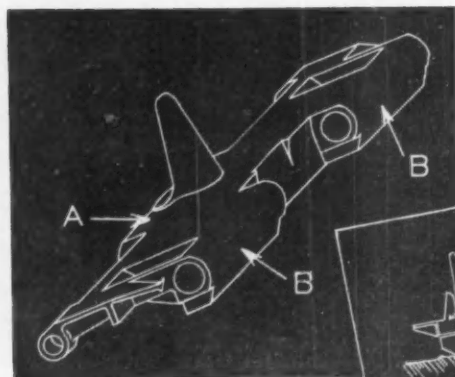


Fig. 5. Single pin track block used in the U. S. Army light tank.

vehicles it is often useful to imagine one or more static, or near static, conditions which may produce maximum stresses. Fig 1 shows a wedge shaped track testing obstacle.

If the down-hill track of a track-layer operating on a side hill is driven slowly over such an obstacle the condition shown in Fig. 2 is possible. Total possible weight thus supported depends upon the location of the center of gravity of the loaded track-layer. In one vehicle investigated it was three-quarters of the GVW. Tensile stress in track sections A and B depend upon angles α . Angles α depend upon track tension, tensioning method, and track stretch. Actual tests will give data to calculate this tension, which is one of the highest possible track stresses.

To save weight track pins are usually tubular. They

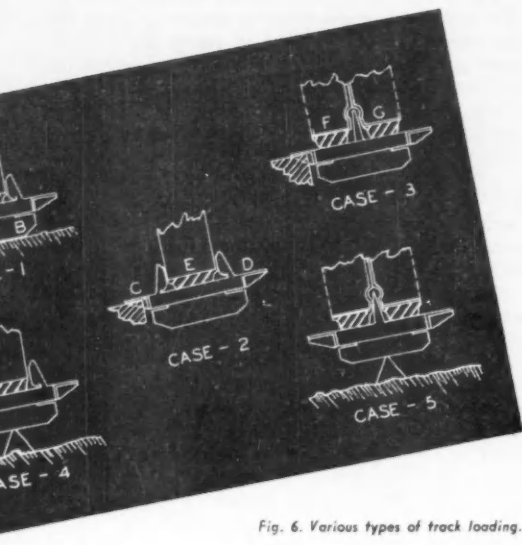
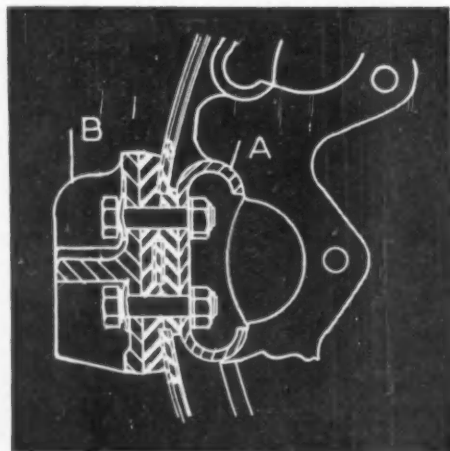


Fig. 6. Various types of track loading.

are designed by the standard beam formulae, using various assumptions as to loading. In one type of rubber bushed track, shown in Fig. 3, it is often assumed that the beam is supported at A-A and uniformly loaded for the length of the rubber bushing. As the "binoculars," which is a common shop name for track blocks, are usually very stiff against edge bending this assumption is practically correct, though tests show slightly more bending than the calculated result. When tracks are overloaded, pin bending shortens rubber bushing life before pin breakage becomes excessive. Closed type end connectors reduce these deflections toward those of a uniformly loaded beam with fixed ends. Fig 4 shows a section of a similar track used in amphibians. Fig. 5 illustrates the single pin type track block used on the U.S. Army light tank, manufactured by the Cadillac Division of General Motors Corp. Division of the load between A and BB reduces the bending of the rubber bushed pin. If metal bushings were used in this track there would be very little deflection until wear took place as the pin would then be in quadruple shear.

Pin diameters vary from 0.44 in. in metal-to-metal "piano hinge" type tracks to 1.25 in. in the heavier rubber bushed tracks. Calculated stresses should be below the fatigue limit.

Vertical loads on tracks may be very high when springs bottom. Various types of loading are shown

Fig. 7. Experimental multiple band track designed for a 40 000-lb amphibian.

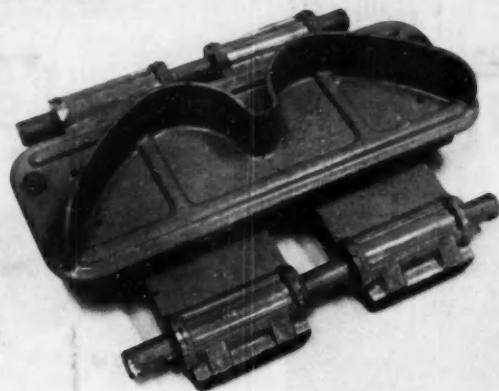


Fig. 8. Common design of water pumping grouser.

in Fig. 6. Case 1 shows fairly uniform support from A to B, and the load distributed by a single bogie tire. In Case 2 the entire support is at C, putting the track in torsion and giving high local loading on the edge of bogie tire E nearest C. Case 3 is similar with the load distributed unevenly between dual bogie tires. Case 4 and Case 5 show conditions with pointed obstacles. The vertical "beam" strength of track blocks must be sufficient to meet these and many other stresses without exceeding the fatigue limit of the material during the track life desired. Obviously, rubber bushings of pins, rubber bogie tires, and rubber on ground and bogie faces of track blocks reduce unit shocks and increase track life. Rubber bushings are usually about 3/16 in. thick. The proper thickness is determined from pin diameter and angular movement, which give the amount of unit stretch of the bushing, and from unit loading. Unit loading from low gear torque may successfully be in the neighborhood of 2000 psi projected area of pin bushing contact. The leading rubber companies have extensive data on the durability of many rubber compounds under varied service conditions.

Metal bushed pins carry much higher unit loads, even with scanty lubrication. With chrome plated pins in ground steel bushings, both parts case hardened

to 60 Rockwell C scale, 5000 psi under low gear pull proves satisfactory.

Most so-called "rubber" tracks contain considerably more steel than is apparent from a casual inspection. Current developments are directed toward increasing their efficiency and life, thus widening the field of track application, particularly in agriculture. Driving forces are usually taken by steel cross members fastened to steel cables—both imbedded in the rubber—or rubber fabric.

Considerable work is being done on tracks with V-shaped ridges — friction driven by grooved pulleys. Detail description of the various types, and illustrations of their applications, are contained in a paper by C. O. Slemmons in the December, 1945, issue of the *S.A.E. Journal*.

It is apparent that the greater flexibility in edge bending and torsion of rubber tracks necessitates different bogie design, positioning and suspension than required with steel link tracks.

Rubber tracks are light and thin, and reaction forces are close to the pitch line, so they are efficient and may be widely used in the near future. Ordinarily it is difficult to carry a spare rubber track, but this is much less serious in commercial than in military application.

One small track-layer has been built using steel band tracks. It is described and illustrated in "The Fighting" (Turn to page 84, please)

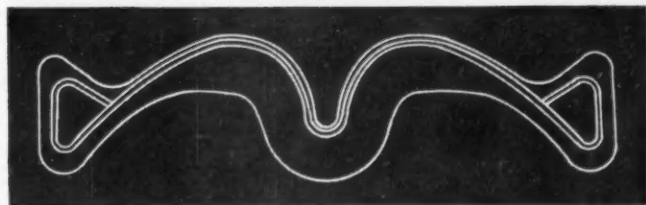


Fig. 9. Experimental grouser designed for better efficiency in reverse.

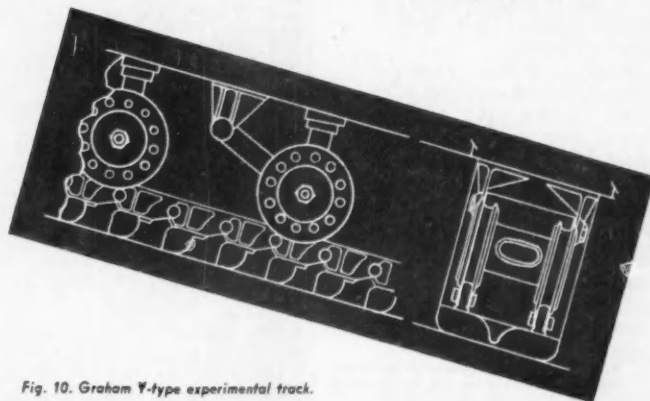
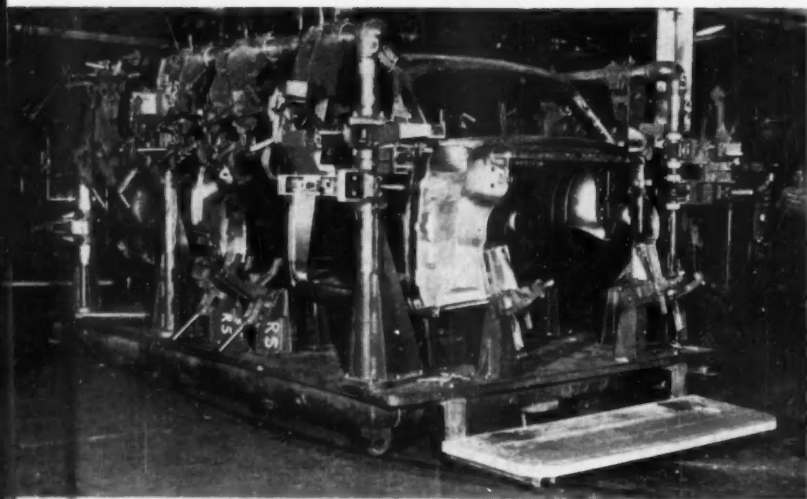


Fig. 10. Graham Y-type experimental track.

Making Packard's

By

Joseph Geschelin



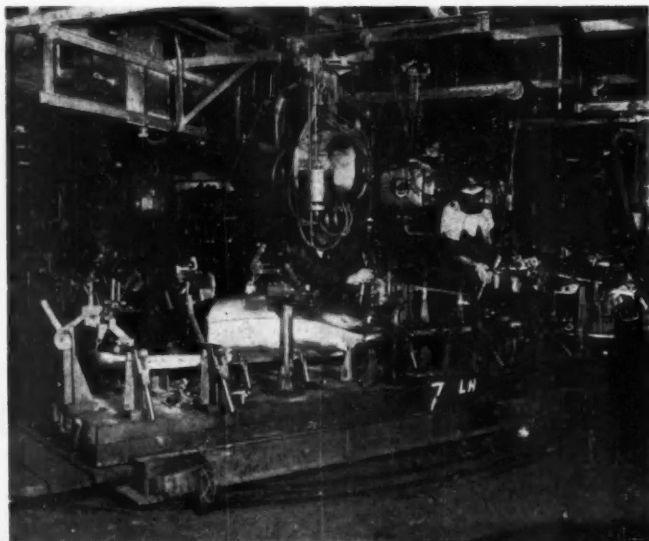
Close-up of one of the massive framing fixtures in which the new Packard bodies are welded into an integral structure. The framing fixtures ride on the merry-go-round conveyor.

FRESH styling and modernity of structural design are characteristic of the bodies for 1951 Packard cars, described in *AUTOMOTIVE INDUSTRIES*, Sept. 1, 1950. Built by Briggs Mfg. Co., at its Conner plant, the Packard bodies have entirely new sheet metal with an unusually large one-piece rear quarter section encompassing the rear fender. The front pillar is slender while body side rails and roof rails are of box-section construction. The cowl top cross bar, too, is of box section. The floor pan is heavily ribbed for greater rigidity and freedom from drumming.

Despite the use of slender front pillars, an enormous windshield opening, and a wrap-around rear window, the completed body is welded into an integral structure of great strength and durability. Among the unique structural features is

the newly designed rear quarter which incorporates the wheelhouse as an integral part of the rear fender section, imparting additional strength and rigidity at the rear.

Although Packard bodies are completely new, manufacturing methods conform in most respects to the methods and equipment developed in Briggs plants over the years and applied to the production of post-war Packard convertibles initially. To put it another way, the 1951 bodies have not posed unusual problems



View of one of the stations on the Briggs merry-go-round welding line for preparing Packard body side assemblies.

Newest Bodies

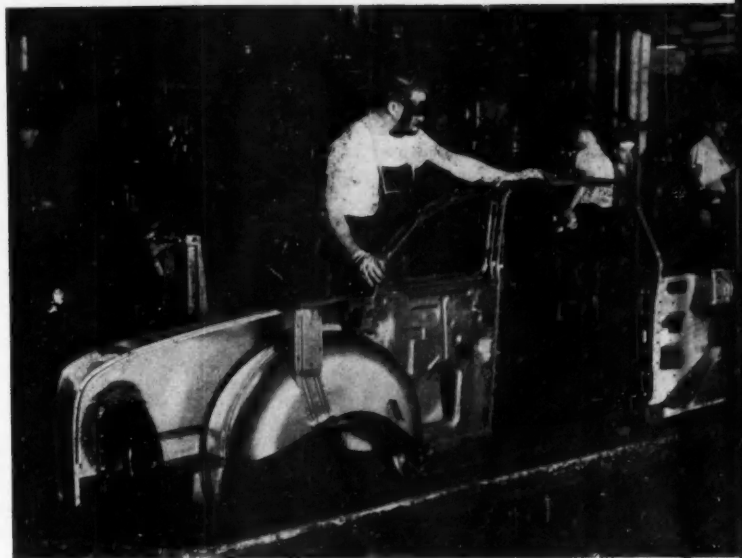
at the Briggs Plant

that might require unique treatment.

The rear wheelhouse, as mentioned earlier, is decidedly a new development. Since it is now a structural member, it is produced by seam welding to assure waterproofness and is welded securely to the rear quarter section at areas where the spot welds are not directly visible.

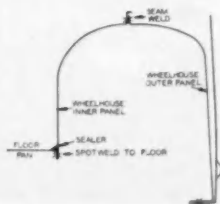
Another innovation is found in the assembly of the rear floor pan extension to the quarter panel. Because of its exposed location, means must be taken to secure a positive seal against dirt and water which might otherwise seep through spot welded joints. In the new design, the lower edge of the extension member is provided with a channel into which is assembled a rectangular-shaped extruded seal of a special formulation developed by Minnesota Mining & Mfg. Co. An unique property of this material is its ability to swell or expand about 40 per cent in volume after going through the body baking ovens. This fills the cavity under pressure and provides an effective seal against the weather. The two sketches reproduced here show typical cross-sections through the rear quarter giving the details of the sealing means described above, as well as the design of the structure about the wheelhouse.

Several years ago we described the use of the "poke" gun as one of the important developments in welding techniques at Briggs. The "poke"



One of the Packard two-door body side panel assemblies showing the method of joining the wheelhouse to form an integral part of the rear quarter.

Sketch showing cross-section through rear fender section to indicate method of joining the wheelhouse to the panel.

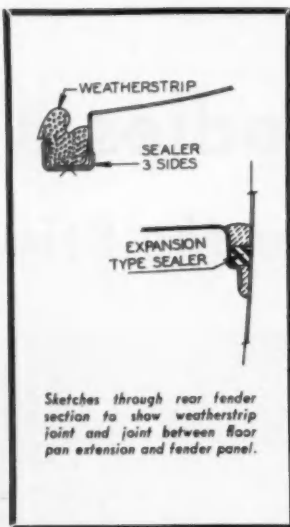


gun is a small pistol grip gun used for producing spot welds in locations where welding can be done from one side only. It is a better and faster means of welding than gas welding for certain purposes. One of its major features, as applied at Briggs, is the use of a helium atmosphere. The single electrode, operating in the helium atmosphere, puddles the top sheet and this, in turn, melts the second sheet to produce the weld. Poke gun welding, however, requires much better sheet metal fits than for conventional gun welding due to the absence of means for pressing the two sheets together. An example of poke gun welding on

Packard bodies is illustrated here.

A sample of photographs taken on the Packard body line will give the reader an impression of current Briggs methods. Merry-go-round welding lines have been characteristic of Briggs practice for many years. This principle is employed in welding right- and left-hand body side assemblies and roof assemblies. It is extended to complete body framing, as illustrated, with the massive framing fixtures riding the conveyor.

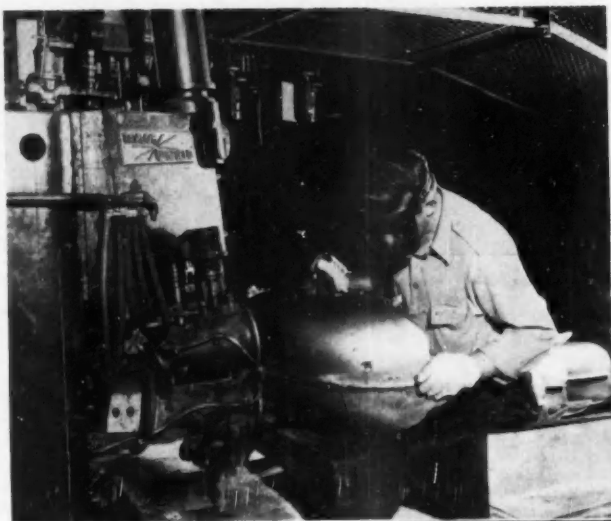
The second floor layout is designed for the most efficient handling of the multiplicity of operations that enter into the painting of modern bodies. Its



distinctive feature is a comprehensive installation of direct-fired recirculating air ovens for all drying operations.

The modern design of the building has had a lot to do with the practicability of making a clean and accessible installation of these ovens. Outwardly, the Conner building has the appearance of a four-story structure. Actually it has only two floor levels, but each one has a ceiling height corresponding to two stories. This provides extensive space overhead, facilitates the use of equipment of any size, and promotes excellent working conditions.

Paint shop equipment described in *AUTOMOTIVE INDUSTRIES*, August 1, 1947, was one of the most advanced postwar installations in the industry.

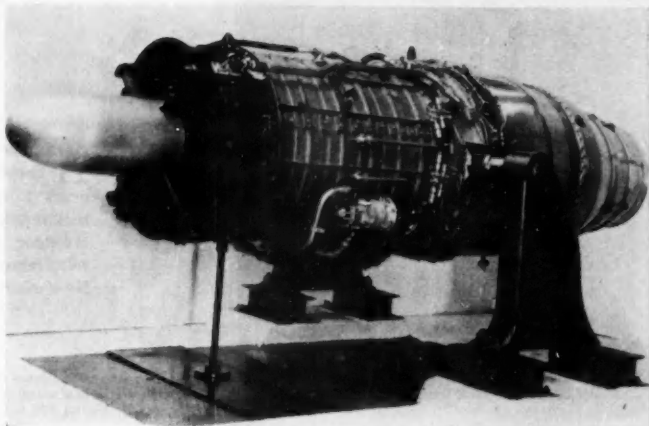


Taylor-Winfield seam welders now are used for joining the halves of the Packard rear wheel house. The joint is made weatherproof with this operation.

This is an example of one of the uses of the "poke" gun in making otherwise inaccessible welded joints in the new Packard bodies.



New Engines and Planes at British Aero Display



The Sapphire, built by Armstrong Siddeley, is claimed to be the most powerful turbojet in existence.

London, England

EXCELLENTLY staged and perfectly timed, the Eleventh Aero Display held last month at Farnborough by the British Society of Aircraft Manufacturers, claimed to have the fastest interceptor fighter, fastest night fighter, fastest amphibian, fastest propeller-driven airliner, most powerful twin engined jet, the world's only turbo-propeller airliners, largest twin-engined airliner, largest, heaviest and most powerful landplane airliner, most widely adopted fighter, best-selling postwar airliner and the lowest priced four-seater.

Consisting of a static exhibition with 190 stands and a flying display with planes sent off at minute intervals, there were 58 planes on the ground, of which 20 made their appearance for the first time.

Most powerful turbojet in existence, the Sapphire built by Armstrong Siddeley, has a sea level static thrust of 7200 lb, for a specific fuel consumption of 0.907 lb/hr/lb thrust. Its net dry weight is 2500 lb. Although having completed 150 hours' service type test at 7200 lb thrust, and flight tests on a Gloster Meteor

8, the Sapphire is still on the secret list and little data have been issued regarding its features. It is a straight jet with an axial flow compressor and an annular combustion chamber, diameter being 35.25 in.; diameter over trunnion mounting, 37.3 in.; length overall from front of nose fairing to exhaust cone rear flange, 133.85 in.; jet pipe diameter over heat shroud, 24.5 in.; and frontal area 6.8 sq ft.

At the other end of the scale Armstrong Siddeley has produced the Adder, a straight jet in the 1000-lb thrust class, with a diameter of only 28 in. and a weight of 550 lb. This machine is really the Mamba without its propeller and reduction gear, and has all its essential parts interchangeable with the Mamba. Armstrong Siddeley continues the Python and the Mamba prop jets, as well as the double Mamba.

De Havilland Ghost and Goblin jets have undergone detail refinements, particularly in the extension of bleeds for heating the fuel, deicing, etc., and in the design of the flame tubes. A Ghost was shown with a reheat tube, but it is understood that this was a Ministry of Supply requirement, fitted to give extra power for military purposes. For extra power for take-off on commercial planes De Havilland prefers the Sprite rocket giving 5000-lb thrust for 12 sec.

Rolls Royce displayed its three main "river" types, the Nene, Derwent and Dart, with maximum thrusts respectively of 5000, 3600 and 365 lb, the first two being turbojets and the last a turboprop of 1400 hp.

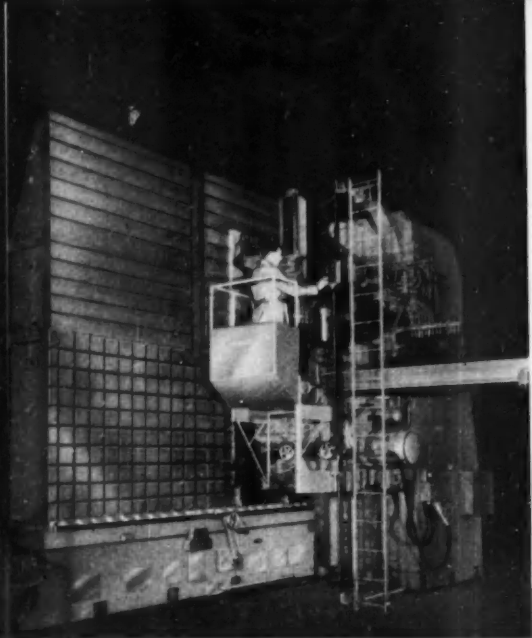
(Turn to page 86, please)

By W. F. Bradley

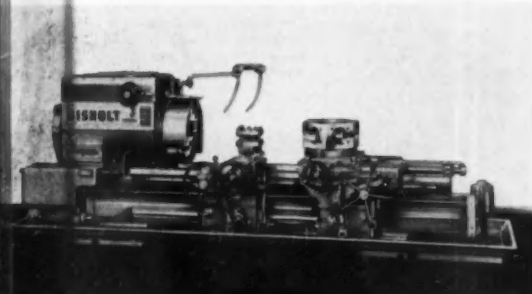
Special European Correspondent
for Automotive Industries

Latest at

ALREADY partially completed, a \$5 million factory expansion program at Lockheed Aircraft Corp. will take advantage of the latest techniques in forming and processing heavier, stronger materials to meet the greater stress requirements of near-sonic jet plane speeds. New machines now being installed will be housed

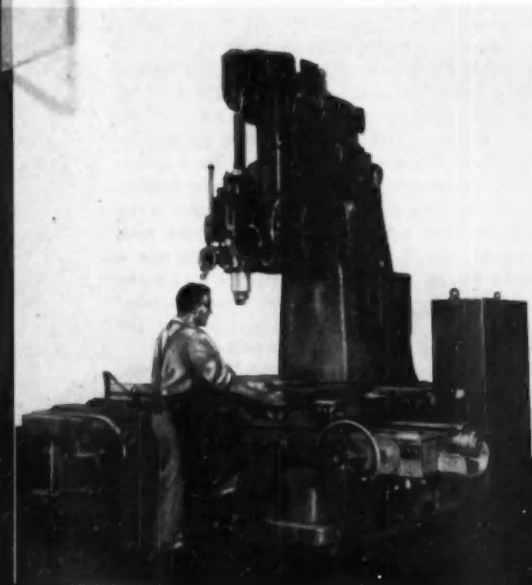


← This horizontal Cincinnati Hydro-Tel is among the largest and most versatile tracer-controlled machines ever built. Equipped with high-power, high-speed spindles (50 hp at 7200 rpm) it produces parts rapidly by tracing a model of the part

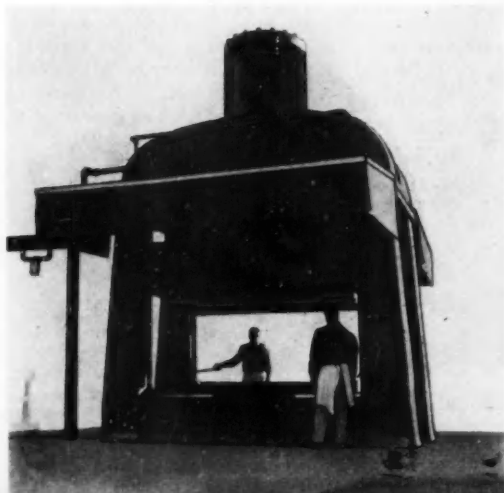


← One of these newest and largest (capacity up to six in. round bar stock) high-speed Gisholt turret lathes is being installed. This lathe machines from a single piece, parts that formerly involved both multiple components and a larger number of operations

For precision boring large tools to 0.0001 in. tolerance over a work area 36 in. by 72 in., this Pratt and Whitney jig borer is said to be the only American-made machine of this size equipped with a rotary table. The 42 in. rotary table represents an improvement in the manufacture of circular-indexing tools and is a proven time saver on this size machine. The table also tilts for use on difficult layout work



← Difficult forming of high-strength aluminum alloys can be done easily on this new 20-ton, 120 in. by 96 in. Ceco stamp, built by the Chambersburg Engineering Co. Claimed to be the largest in the industry, this machine further contributes to producibility by eliminating hand forming of short-run parts of unusual shape



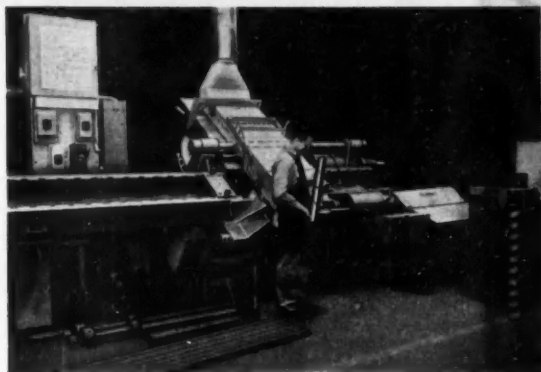
Equipment Lockheed

in a 33,000 sq ft building which will parallel the present final assembly line on Hollywood Way. Lockheed is reversing the usual process of erecting a building and then installing machinery. Because of their great size, all of the heavy pieces of production equipment are being erected in the open. A steel and concrete building will be constructed after the machines are installed.

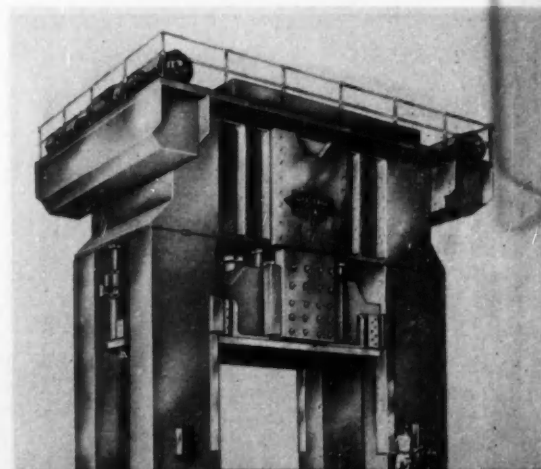
Lockheed is one of two airframe manufacturers with a 14 in. by 72 in. external grinder for hard chrome metals. The "finger tip," self-balancing arbor—a feature of the Cincinnati grinder shown—aims in reducing production lat cycle time



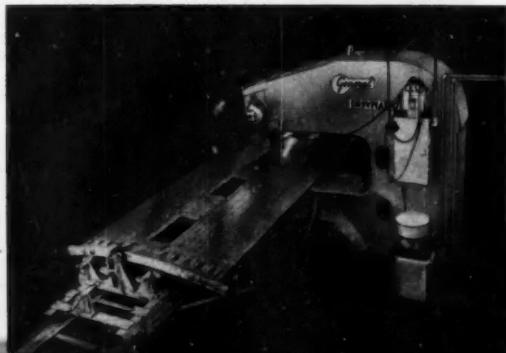
This 400 kva Taylor-Winfield flash welder qualifies for either aluminum or high alloy steels. It is capable of full compliance with the requirements of specification AN-W-31 which stipulates a weld up to five sq. in. sectional area on such parts as six-in. 4130 steel tubing



This Birdsboro 8000-ton deep draw hydraulic press, said to be the largest of its type in the world, extends 36 ft above the factory floor, although its base is embedded 12 ft into the building's foundation. Deep drawing, blanking, trimming, piercing, coining, and rubber pad forming can be done on this machine. It produces parts in one-piece from heavy gage alloys to replace multiple parts previously assembled



A new automatic riveter, this General Drivmatic, is an exceptionally versatile production machine that drills, countersinks, then squeezes hopper-fed rivets up to one-quarter in. diameter. Adjustable indexing and locating devices make it possible for one operator to rivet an entire wing panel on a single machine



Latest Equipment at Lockheed

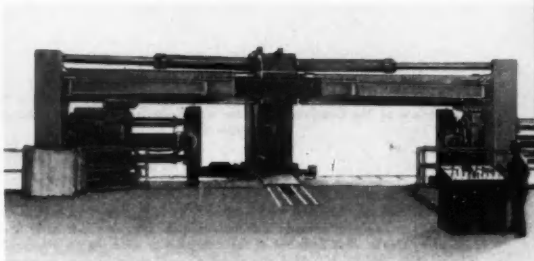
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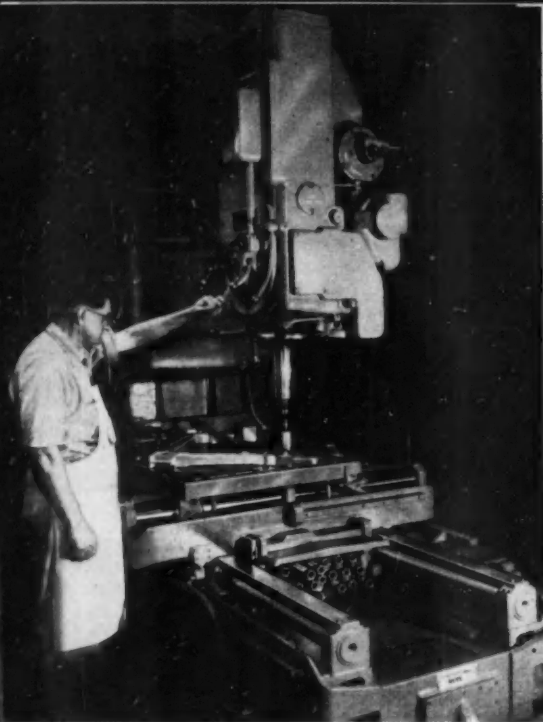
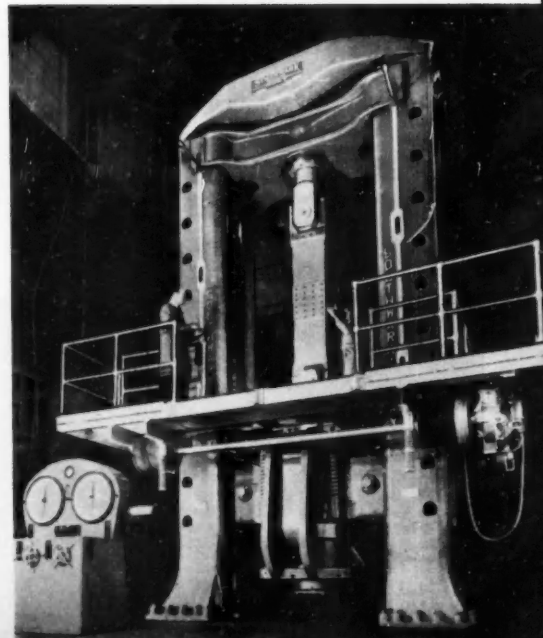
This Cincinnati-Bickford precision drill, equipped with a Bullard Man-Au-Trol table can perform fast, repetitive drilling operations without the use of jigs. Parts of any size within the capacity of the machine are automatically positioned under the spindle. Storage and maintenance of drill jigs are eliminated



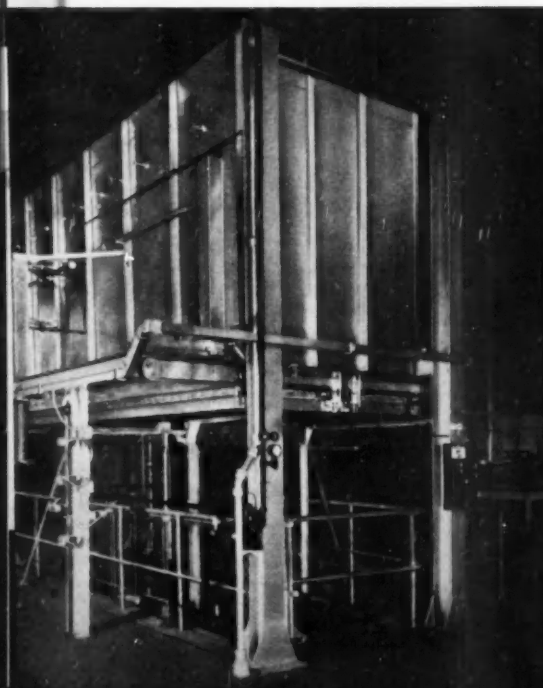
Pictured here is the 200 ton Hufford stretch press, a combination machine for stretch forming heavy skins, stringers, and circumferentials and longerons of extruded materials. This machine is said to have twice the tonnage capacity of any other stretch press in the industry.

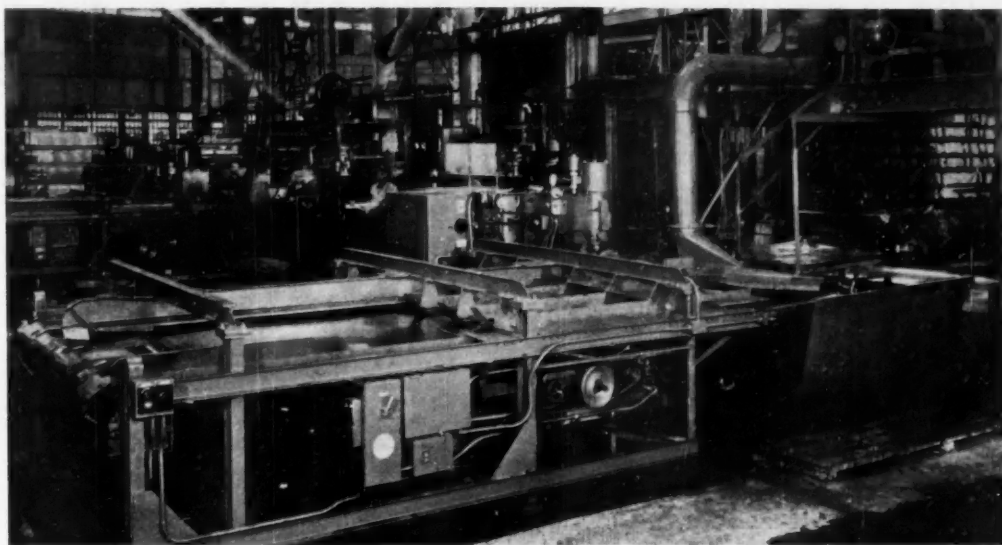


This giant Southwark machine, soon to be installed, will be used to proof-load flash welded parts. Parts are loaded to 76 per cent of the bending modulus of the parent metal and the welds to 95 per cent of the tensile strength of the parent metal. Actual full scale production parts can be tested to a million-lb load



Three thousand lb of aluminum parts can be quenched in this 36-ft quick quench Knapp-Lee furnace. A choice of dunk, spray or hot water quench is at the disposal of the operator. The furnace is equipped for reduced kilowatt input which permits its use in aging 24-ST material





Sheets are loaded onto a table, overlap is automatically made, and they are fed through the welding wheels of this machine at Ford Motor Co.

Wider Steel Sheets By **WELDING**

STEEL supplies for the automobile industry have been tight ever since peacetime production was resumed at the end of World War II, and one of the tightest of the items has been the extra wide sheet needed for the body stampings of today's cars. In addition to the short supply of the wide stock, it carries a price extra about twice that for the 36-to-48 in. steel.

One of the means of stretching the supply of wide stock developed by the industry during the period of extreme shortages, and continued because of its cost saving, is the welding of steel with either a lap weld or a butt weld to produce wide stock for blanks from narrower steel. Welding methods used include seam welding, multiple spot welding, flash butt welding, and mash welding. The first two processes produce a lap weld that is suitable for use in concealed parts of the car body, and the two latter processes make a seam that, when grounded down flush and covered with the customary finish, is invisible.

Ford Motor Co. has been using both front and rear floor pans of welded steel sheet. The front floor pan, requiring a blank 60 in. by 69 in., is made by

joining two pieces each 34 13/16 in. by 60 in. with a roll seam weld having 5/8 in. overlap. The rear floor pan requires a 70-by-86-in. blank, and two pieces, one 36 1/4 in. by 70 in., the other 50 1/2 in. by 70 in., are roll seam welded with the same overlap.

As there is a double thickness of metal at the weld, the presses are operated with the dies opened slightly to allow for the lap.

The special machine for handling and welding was designed to hold to a minimum the amount of manual effort and the number of man hours required. It was described and illustrated in the January 1, 1949 issue of *AUTOMOTIVE INDUSTRIES*.

Fisher Body Div. of General Motors Corp. is using multiple spot welds to obtain the same effect.

For exposed surfaces in the car body, the smooth weld is a money-saver. Budd Co., making roof panels for an automobile manufacturer, has been welding ears to the sides of a wide sheet to provide the extra width needed at those locations on the blank. The steel tabs are joined to the sheet by means of mash welds, made on a seam welder. When the slight thickening resulting from the weld is ground off, and the piece has been formed, assembled into the body and finished, the weld line is invisible. Most of the steel added in these tabs is removed during forming operations, but the welding operation saves the metal that would be lost from a full-width sheet.

Hydraulic Dynamometer Has Internal Cooling System

By A. E. Sorenson

Associate Professor of Mechanical Engineering
Princeton University

PRINCETON University has developed a hydraulic dynamometer which is mostly made in its own machine shop and which costs from \$100 to \$200 for material depending on the size. This dynamometer in various forms has been found to give reliable results with an ease of operation approaching very closely that of electric dynamometers. Units are made in 15, 16 and 19 in. sizes.

Cross section through a 16 in. dynamometer is shown in Fig. 1. The cooling coils of $\frac{1}{2}$ in. OD annealed copper tubing are arranged in two sets with cooling water entering at the front top and leaving at the rear bottom for the outer coil and for the inner coil entering at the rear top and leaving at the front bottom.

The amount of cooling surface necessary

(Turn to page 83,
please)

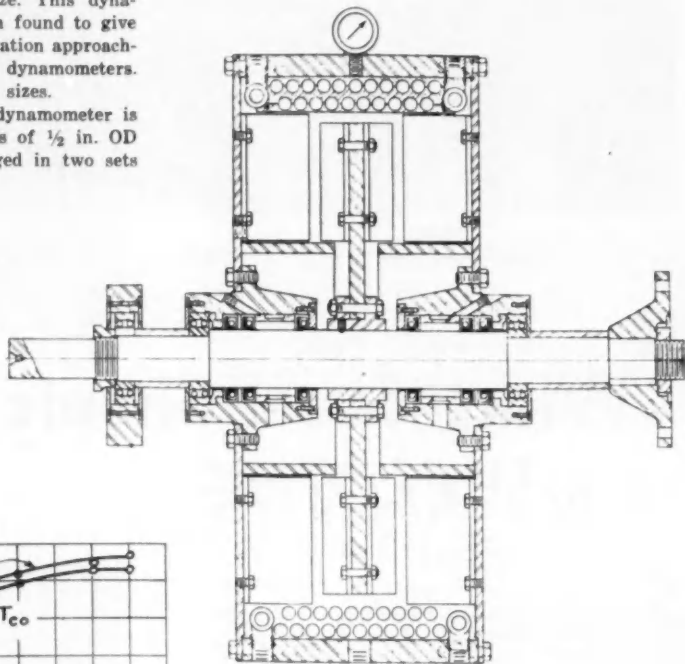


Fig. 1—Cross section through the 16-in. dynamometer.

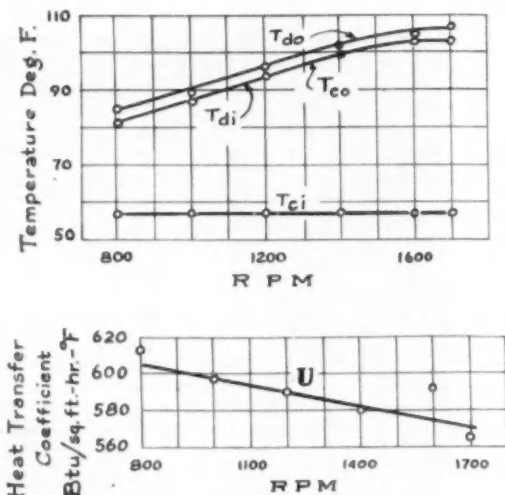


Fig. 2—Temperature conditions in the 16-in. dynamometer when coupled to a General Motors 3-71 Diesel engine are shown in the top graph. Coefficient of heat transfer is plotted in lower graph. Full pressure on cooling water. Average velocity in coils, 9.2 fps.

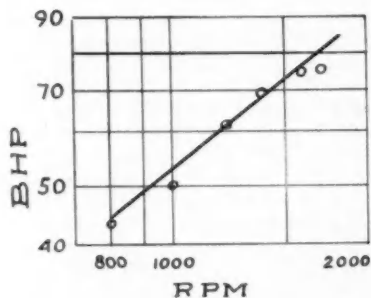
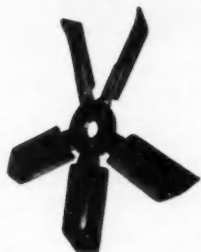


Fig. 3—Logarithmic plot of hp versus rpm for test run on the Diesel engine.

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Designing and manufacturing cooling fans, all types and sizes, has been an important part of our business for 31 years. We have produced untold millions of fans for all sorts of services, all over the world. Often we are the only source for fans for large automotive programs, always we are busy producing for a multitude of smaller users whose requirements range through the entire scale of types, sizes and materials and carry all the special features incident to fans. It is routine for us to be asked to develop and build a fan for some problem job of cooling, something that will improve performance or reduce costs, or both.

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Illustrated are three outstanding examples of an unusual fan design developed by us—all of the laid-back tip type, all with high capacity and very quiet—one 18" in diameter, 3-blades, one 21" diameter, 5-blades, one 26" diameter, 6-blades. All these fans completely fulfill the objectives of the buyers and save them money. All are in large production. These illustrations present a small example of the diversification of our fan operations.

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PRODUCTS**

OIL PUMPS

WATER PUMPS

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**AUTOMATIC
SHAFT SEALS**

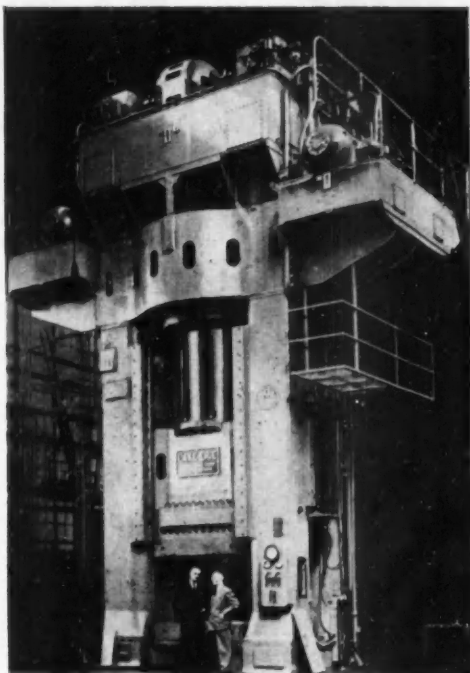


• PRODUCTION • EQUIPMENT • PLANT •

NEW NEW



FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 62



Lake Erie 700,000 lb Hydraulic press for the cold extrusion of steel

M-44—Press For Cold Extrusion of Steel

Faster production of artillery and other shells at a great saving in cost is expected from work now being performed on a huge new 56 ft high Hydraulic press manufactured by the Lake Erie Engineering Co., Buffalo, N. Y. Just starting in operation at the plant of the Mullins Mfg. Corp. at Warren, Ohio, this 700,000 lb machine concentrates as high as 100 tons per sq in. pressure on a steel billet or "slug" in specially constructed dies. The process causes the steel to flow in the cold state around a mandrel where it assumes, first the shape of a shallow heavy-walled cup, and through subsequent operations the approximate shape of a finished shell. The operation, termed "cold steel extrusion" results in reduction of scrap and in improved accuracy of the shells due to probable uniformity of weight

and concentricity—both said to be impossible with former production methods.

The company points out that the press and process should interest manufacturers who have a commercial product that is a thick-walled steel cup or a hollow cylinder of such nature that it may or may not require additional shaping, and which requires fairly high physicals in the final end product.

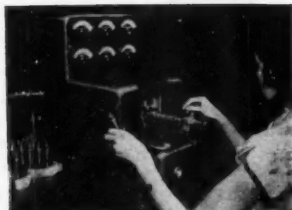
This first press specifically designed and manufactured in this country for steel extrusion exerts a maximum force of 3000 tons and is operated from push-button controls by a 900 hp motor driven pumping unit mounted on the top.

The press will be put to initial work by Mullins to produce a pilot lot of projectiles for the 105 MM howitzer and anti-aircraft projectiles for the navy. Engineers contend that the million tons of steel scrap resulting from production of 100,000,000 105 MM shells as ex-

perienced with the forging method employed during World War II, will be reduced by the extrusion process to 40,000 tons.

M-45—Multiple Station Limit Gage

At the rate of 300 parts per hr all critical dimensions of a precision eccentric shaft are checked simultaneously on a multiple station Electrolimit



Pratt & Whitney multiple station Electrolimit gage for chucking 300 eccentric shafts per hr for taper, throw, concentricity and diameters

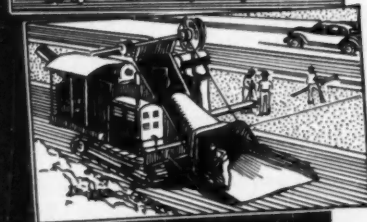
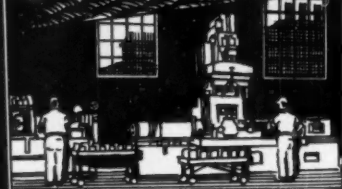
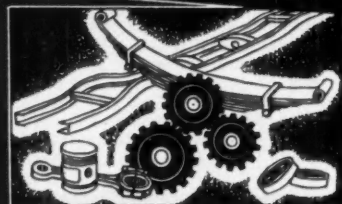
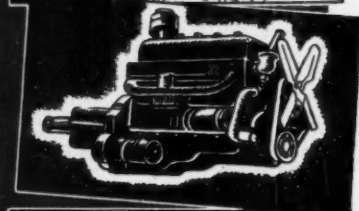
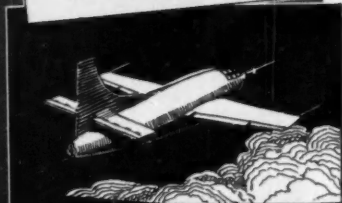
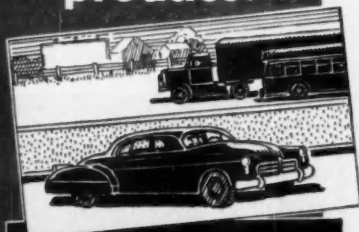
gage put out by Pratt & Whitney, Division of Niles-Bement-Pond Co., West Hartford, Conn. One semi-skilled operator inspects diameters, bearing concentricity, bearing taper, and throw of eccentric in a single operation. Formerly the various tolerances were checked on individual Electrolimit gages.

Gaging is completely automatic. The operator merely loads, notes the dial readings, and unloads. To check a shaft, the operator places it in a cradle at the front of the gage and presses a button. The part is automatically conveyed to gaging position where it is rotated by electric motor between the Electrolimit contact fingers. This actuates the dials, which are calibrated in hundred-thousandths of an in. Limit hands show at a glance whether parts are within tolerance. When readings are completed, the operator releases the button and the shaft is automatically ejected from the gage.

Multiple station Electrolimit gages may also be obtained to gage a number of dimensions at once on pistons, armature shafts, hubs, bushings, bearings, housings and similar parts.

(Turn to page 58, please)

**The
automotive
industries
produce:**



What do the automotive industries purchase?

Answer:

Annually, billions of dollars worth of parts, materials, machine tools, supplies, forming presses, plant equipment, services . . .

AN \$8 BILLION ORDER FOR AMERICAN INDUSTRY

During 1949, the automotive industries wrote out an \$8 billion purchase order for American manufacturers and suppliers to fill. Large scale buying must be done to maintain top production of cars, trucks, buses, tractors, aircraft, engines, parts, accessories, automotive materials and equipment, farm and road-working implements.

THOUSANDS OF SUPPLIERS INVOLVED

A typical, medium-sized automotive manufacturer buys from 7300 suppliers, who furnish 70,000 different kinds of items, varying from raw materials and production equipment to parts and materials—from abrasives to zinc. Automotive firms spend well over half of their total dollar receipts for supplies!

HOW TO GET YOUR SHARE OF THIS MARKET

AUTOMOTIVE INDUSTRIES magazine reaches and influences *23,000 *proved* readers in 3118 automotive manufacturing plants from coast to coast. It is the industries' **ONLY** magazine that provides full coverage of new automotive design, production and industry developments. (A.B.C. circulation, 12,157 . . . subscription renewal rate, 82.55%!)

**From Advertising Research Foundation Business Paper Study #1.*

AUTOMOTIVE INDUSTRIES

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Philadelphia 39, Pa.



A CHILTON Publication



. . . the industrial automotive NEWS MAGAZINE



NEW EQUIPMENT



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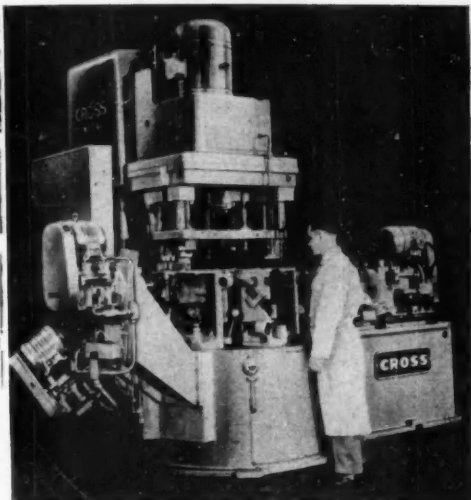
M-46—Finishing Machine For Transmission Cases

Another special machine tool has just been delivered by the Cross Co., Detroit, Mich., to one of the "Big 3" automotive companies for drilling, reaming, and spot facing automatic transmission housings. The new machine is a five-station, dial type with power driven index table. One operator finishes 85 pieces per hr at 100 per cent efficiency, performing 29 operations.

Use of the recently announced Cross Machine Control Unit with Toolometer is a feature. This ingenious device stops the machine when any tool requires changing and groups the changes to reduce down time. Preset tools further reduce down time by eliminating adjustments for tool changes.

Other features include automatic lubrication, J.I.C. Standard hydraulic and electrical installations and the use of standard Cross sub-assemblies to facilitate maintenance. The machine design additionally allows flexibility for reasonable part design changes.

Cross special machine for finishing automatic transmission cases



M-47—Line Boring Machine For Cam and Crankshafts

On the line boring machine for engine blocks, offered by the Ex-Cell-O Corp., Detroit, Mich., crankshaft and camshaft bearings can be precision line bored simultaneously to extremely close tolerances in an automatic cycle. The operator pushes the blocks into the fixture, presses the start cycle button and removes the blocks at the completion of the cycle, net production being from 25 to 35 blocks per hr.

In some instances other precision boring operations can be incorporated in this machine, thereby keeping additional

bore in accurate relationship to the crankshaft and camshaft bores. Dowel holes in the transmission end of the block and distributor shaft holes are sometimes done at the same time on the same machine, it is pointed out.

A perfectly balanced crankshaft cannot run smoothly if the bearing bores in the engine block are not in line. The bearings with caps assembled must be bored with all the tools supported in one boring bar. This is accomplished on the Ex-Cell-O line boring machine, as illustrated.

M-48—Improved Single Spindle Automatics

Two new optional arrangements are offered by the Warner & Swasey

Co., Cleveland, Ohio, on their 1-AC single spindle automatics to broaden threading performance. (The standard machine is normally equipped to cut right-hand threads of from 12 to 32 pitch with collapsible taps or self-opening die heads.)

One new arrangement provides a 10 hp open-frame, intermediate slip, reversing-type main drive motor so that

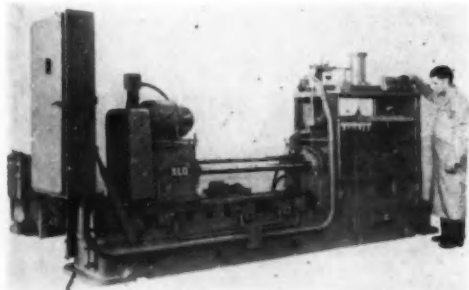
solid taps or die heads may be used as well as the self-opening types. This is a straight-forward method which involves no mechanical changes in the machine, while maintaining tapping torque in proportion to the capacity of the main drive motor and speed of spindle. A fixed trip on the machine's pentagonal selector drum actuates a limit switch



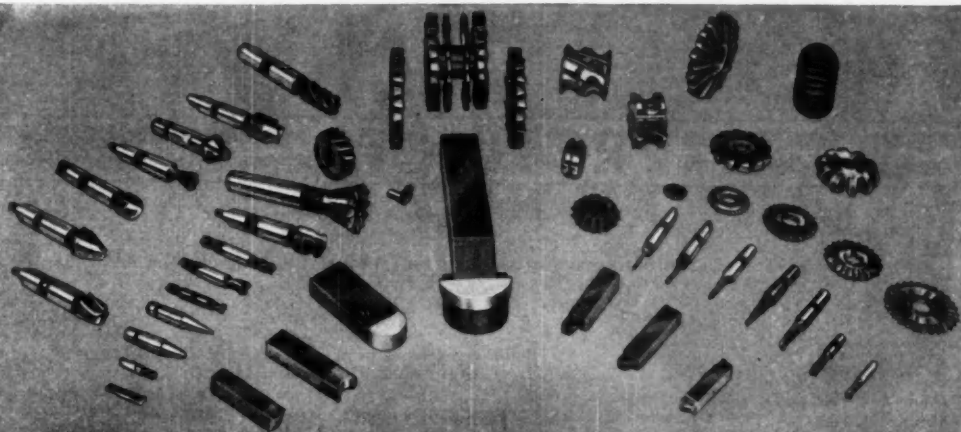
Warner & Swasey arrangements for broadening threading capacity of Company's single spindle automatics

ordinarily used to cut in a late cross slide, but which in the tapping cycle is used instead to reverse the motor. When the motor reverses, the tap feeds out of the work at the prescribed rate and the machine then cuts back into rapid

(Turn to page 98, please)



Ex-Cell-O line boring machine for camshaft and crankshaft bores



All These Tools were sharpened with
correct angles, radii and tangents on the...

PRATT & WHITNEY CUTTER AND RADIUS GRINDER

TYPE R-6

Maximum length
of flute 4½"

TYPE R-8

Maximum length
of flute 10"



PRATT & WHITNEY

Division Niles-Bement-Pond Company
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SOLVE YOUR CUTTER SHARPENING PROBLEMS

The Pratt & Whitney Cutter and Radius Grinder is a sound tool investment that brings immediate returns through lowered sharpening costs, improved cutter life and better stock removal.

It sharpens milling cutters; end mills; thread milling cutters; lathe, shaper and planer tools; form cutters; die sinking and churning cutters; reamers; Keller cutters and tracers; and special tools. Whether standard or special — straight or spiral flutes — square, radius or ball ends — it grinds them uniformly, accurately and concentric with hole or shank, and with precision blending of angles and radii.

Write today for free bulletin describing this unusually versatile and economical machine.

MACHINE TOOLS • CUTTING TOOLS • GAGES

90th  Year

SYMBOL OF ACCURACY SINCE 1860

NEW PRODUCTS

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P-73—Redesigned Low Pressure Cylinders

Available in a wide range of mounting styles, completely redesigned 14 in. and 16 in. low pressure cylinders for 125 psi, air, or 160 psi, hydraulic, are announced by Hannifin Corp., Chicago, Ill. Cup-type pistons and chevron-type gland packings make the new cylinders suitable for air, oil, or water service.

Users' design problems are simplified by compact end caps furnished to the same mounting dimensions either cushioned or non-cushioned. Two large



Hannifin 16 in. x 6 in. stroke type HLW air cylinder

piston ports are drilled in each cap—1 in. in the 14 in. bore size, 1 1/4 in. in the 16 in. size. Double-end rods are available in most mounting styles.

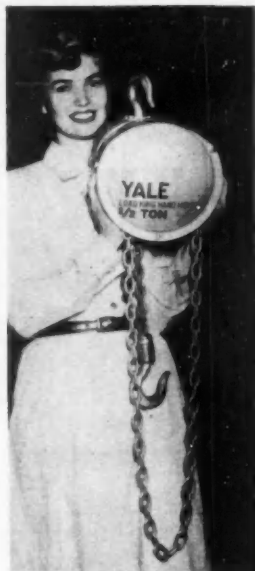
Piston rods are turned, ground, and polished, and bore diameters are "true-bored," then honed to a satin finish. Chrome plating is available on rods alone or on both rods and bores.

Principal applications are where large forces are required especially where pressures are held for long periods of time. The 16 in. cylinder exerts a force of ten tons on a push stroke at 100 psi.

P-74—Hand Chain Hoist

Said to weigh only one-half as much as conventional hoists of the same ca-

capacity, a new Yale hand chain hoist made by the Philadelphia Division of the Yale & Towne Mfg. Co., enables



Yale & Towne "Load King" hand chain hoist

one man to lift 1000 lbs with less work than it takes to climb an average flight of stairs. The new Yale 1/2-ton capacity model (weighing 37 lbs) provides 95 per cent efficiency, permitting a full load to be easily raised three ft in 20 seconds.

Called the "Load King," high strength aluminum castings and alloy steel plus fewer parts, provide "feather-weight" without sacrifice of strength or headroom.

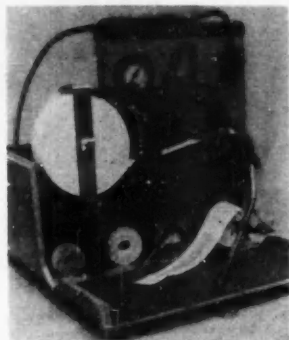
A new load brake "Synchromatic" provides split-second automatic braking when hoisting or lowering. Balanced and cushioned springs force engagement of a six-tooth pawl and a 24-tooth ratchet assuring positive, immediate braking action without any harmful side pressure on bearings. A stabilizer ring speeds brake release for precise inching when lowering, to permit the

load to be gently eased to the floor or accurately spotted at any vertical distance above it.

A one-piece housing for support of shafts and bearings assures alignment for all times. A new chain of heat-treated alloy steel operates over sheaves of the same material.

The "Load King" is available in 1/2, 1, 1 1/2, and 2-ton capacities, with chain provided for a standard lift of eight ft.

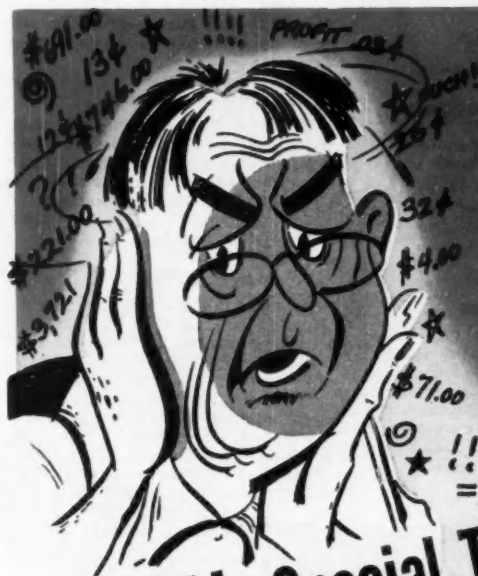
P-75—Recorder for Combustion Analysis



E. K. Von Brand continuous recorder for combustion analysis

*A new continuous recorder for combustion analysis is now commercially available for laboratory and service work through E. K. Von Brand, Dobbs Ferry, N. Y. The instrument is said to utilize for the first time in a continuous manner the time-tested principle of filtering a known volume of gas to obtain a deposit on a moving tape. The varying degrees of darkness of a half inch wide trace furnish a measure of the smoke conditions, i.e. completeness of combustion, under which the equipment tested is operating. Timing marks on the tape indicate the duration of the test and the rate of change in smoking. Adjustment of the sampling stream, the tape speed, and the area of tape exposed at any particular instant facilitates calibration in units of established smoke scales. Typical tape speeds are 2

(Turn to page 64, please)



**PRODUCTION
COSTS Got You
in a Whirl?**

BUNELL Special Tooling and Machines

CAN HELP YOU

- **SPEED PRODUCTION**
- **IMPROVE QUALITY**
- **REDUCE COSTS**

If high production costs are giving you a headache . . . if you need to produce parts faster, better, cheaper . . . Bunell may have some answers for you! For 30 years we've been helping leading manufacturers solve tough production problems.

SPECIAL MACHINES: Bunell has designed and built hundreds of special purpose machines . . . and has a thorough knowledge of almost every type of application.

DIES FOR METAL STAMPING: Bunell has built a reputation for high-quality dies for large and medium size stampings. Complicated or tough die problems are our specialty.

JIGS and FIXTURES: Special fixtures of all sizes—for every conceivable purpose—have been designed and built by Bunell. Bunell facilities are especially suited for extremely accurate work on large size fixtures.

SPECIAL TOOLS: Because of our wide experience, know-how and complete facilities, Bunell is often called upon to furnish special tools of all kinds to meet unusual production requirements.

JOB MACHINE and SUB-ASSEMBLY WORK: 175 machines and 150 men ready to help you with your machining or grinding problems. From Swiss Jig Borer to 20' Planer, 6" G & L Boring Mill, etc., for dependable, accurate work.

REBUILDING SERVICE: Worn or obsolete machines—either standard or special—can be rebuilt by Bunell to give additional years of profitable service.

DESIGNING and BUILDING: Bunell's competent staff of designers and engineers is backed by an organization of skilled craftsmen. Bunell will design and build your equipment . . . or will build special machines or tooling from your own blueprints.

Consult Bunell on your production problems. You can benefit by using our services. Write today or send your own blueprints for quotation.



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BUNELL services,
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MACHINE AND TOOL CO.

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Publications

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L-77 Hydraulic Oils

Sun Oil Co.—A new 8-page booklet directed primarily to executives and oil buyers without a technical background, stresses the importance of using correct hydraulic oil to obtain higher production speeds, precise control, etc. A chart showing the useful life characteristics of Sun hydraulic oils, in relation to time and temperature, is included. Case histories, with photographs of actual operations, are also included.

L-78 Hydraulic Valves

Rivett Lathe & Grinder, Inc.—Ninety different models of hydraulic valves are illustrated and described in a new catalog Section, No. 202. The 52-page 2-color book has illustrations and descriptions of many types of hydraulic valves. Description of each model valve includes working drawings, specifications cutaway views and operational diagrams of piston designs.

L-79 Power Wrenches

The Cushman Chuck Co.—Bulletin No. 215 provides descriptive and technical data on the new Cushman Power Wrench and control equipment. In addition to describing and illustrating the various features of the equipment, the booklet includes installation and operation data, wiring diagrams, etc.

L-80 Presses

Danly Machine Specialties, Inc.—Single action straight side presses are described and illustrated in an attractive new booklet. Photographs of the different type presses are augmented by specifications tables, maintenance data, etc. A large cutaway view of the press is also included.

L-81 Packaged Chains

Morse Chain Co.—Folder F-57-50 gives a complete description of all

Morse Factory-Packaged chains and parts, together with a complete price list.

L-82 Riser Compound

Metal & Thermit Corp.—A new pamphlet describes the Thermit Riser Compound, a new exo-thermic riser compound, and gives instructions for its use. Chemical specifications of metals produced by Thermit Riser Compounds is included.

L-83 Alloy Castings

Michiana Products Corp.—A new 2-color, 16-page booklet, No. 112, describes the various heat-resistant, corrosion-resistant and abrasion-resistant alloy castings produced by the company. Illustrations show centrifugal and static castings, large and small, and descriptions of properties of many of the alloys are included. Tables and charts show mechanical and physical characteristics in convenient form.

L-84 Hydraulic Cylinders

Hanna Engineering Works—Catalog No. 233-A contains 28 pages of illustrations, specifications, design, construction and operation features, and many suggestions for uses of Hanna high pressure hydraulic cylinders.

L-85 Grinders

Mattison Machine Works—An attractive color folder describes and illustrates (Turn to page 98, please)



THIS TIME SAVER COUPON is for your convenience in obtaining, **WITHOUT OBLIGATION**, more information on any one or more of the publications described above **OR** New Production and Plant Equipment **OR** New Products items described on other pages.

**Readers' Service Department,
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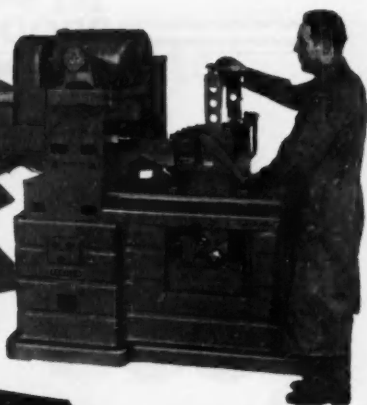
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Your Company Connection or Business

Address (Street & No.) (City) (Zone) (State)

**8 SURFACES MACHINED
1046 PIECES
... PER HOUR ...**

ON EX-CELL-O PRECISION BORING MACHINE



Operator placing pistons on loading pins. Movement of the loading lever controls the automatic machine cycle.

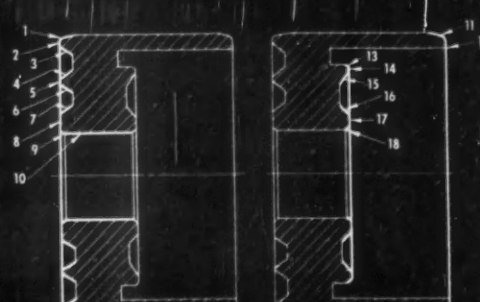
Two Style 112-C Ex-Cell-O Precision Boring Machines finish eighteen surfaces of the parts shown in the drawings at right below. One machine finishes 8 surfaces at the net rate of 1046 pieces per hour; the companion machine finishes 10 surfaces at the net rate of 640 pieces per hour. The parts are automotive shock absorber pistons, approximately one inch in diameter.

The spindles, four on each machine, operate continuously. Work loading equipment and automatic ejection of finished parts contribute to the extremely fast machine cycles.

Whether your work involves precision machining in large volume or in small lots you'll find that it's economical to use standard machines whenever possible. Ask your Ex-Cell-O representative for complete information on standard Ex-Cell-O Precision Boring Machines.



50-20



EX-CELL-O CORPORATION

DETROIT 32
MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • BORING MACHINES • DRILL JIG BUSHINGS • AIRCRAFT AND MACHINE TOOL PARTS • PUMP PARTS • VALVE PARTS

NEW PRODUCTS

(Continued from page 60)

and 4 in. per min. the company reports.

High sensitivity and quick response in addition to the permanent record are designed to make this portable instrument serviceable in testing and adjusting internal combustion engines, oil


burners, or fuel consuming equipment in general for clean combustion. Results of existing instrumentation can now be supplemented by readily obtainable records covering effects of changes in load and speed, performance of transmis-

For additional information regarding any of these items, please use coupon on page 62

sions, automatic chokes, injectors, etc. Changes in the content of sulphur or other constituents of the gas stream under test can be recorded by means of tape suitably activated for producing a visible trace.

The standard 110 volt, ac model is shown in carrying case 13 by 10 by 13 in., ready for use. Separate switches control vacuum pump and tape motion for greater flexibility. Lower voltage models for road tests are made to order.

**BALLS FOR BEARINGS
AND OTHER BALL APPLICATIONS**



**PRECISION
BALLS**

BRONZE · CHROME ALLOY · STAINLESS STEEL · STEEL
K. MONEL · MONEL · COPPER · COPPER · GLASS · PLASTICS · ALUMINUM · DRILLED BALLS

Precision balls made for your job — available in a variety of materials. Your specifications will receive prompt attention in our Engineering Department. We are thoroughly experienced in supplying the automotive industry with special bearings, retainers and balls. Let us give you our recommendations.

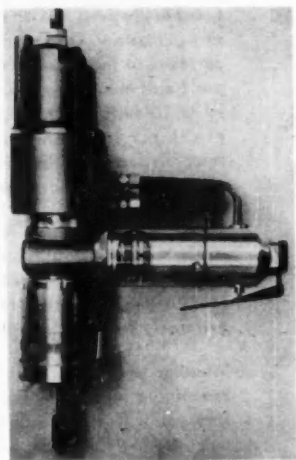
THE HARTFORD STEEL BALL CO. HARTFORD 6, CONN.

DETROIT W. J. TURNER	CHICAGO VICTOR A. GLENN	NEWARK, N. J. GUARANTEE TRUST BROS.	LOS ANGELES, CAL. L. B. WALSH CO.	EXPORT R. A. RODRIGUEZ, INC.
445 NEW CENTER BLDG.	335 W. WASHINGTON BLVD.	972 BRAD ST.	1718 SOUTH FLOWER ST.	55 W. 42ND ST., NEW YORK

P-76—Air-Powered Counter-Sinker

A portable, air-powered counter-sinking tool which supplies its own thrusting action, and has self-locking grip that holds the tool firmly to the work sheet while operating, is a new product of the Buckeye Tools Corp., Dayton, Ohio, manufactured and sold under exclusive license granted by Boeing Airplane Co.

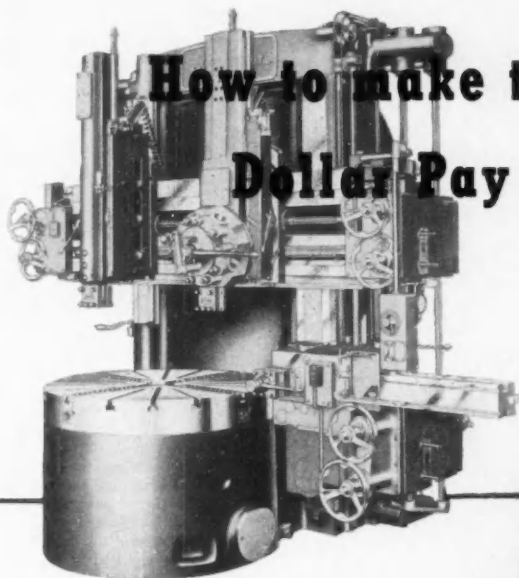
Almost completely automatic in operation, the tool requires no manual effort on the part of the operator other than inserting the mandrel in the hole to be countersunk. Expansion of the



Buckeye portable, air-powered counter-sinking tool

mandrel "locks" the tool in operating position. Drilling speed and depth of cut are pre-determined and automatically controlled. When the counter-sinking operation is completed, the mandrel contracts, permitting removal of the tool from the hole. Automatic operation also assures perfect concentricity between the hole and the counter-sinking cut.

The new tool, which has been designed



How to make the Invested Dollar Pay More

Increased Shop Efficiency through Replacement of Economically tired machines.

Initiative in applying machines to the job.

Development of short cuts and tooling arranged to improve time savings since increased machine efficiency as well as shop efficiency pay more on the Invested Dollar.

Investment in machines of complete flexibility having the potential facilities to adapt themselves to present and future changes of tooling and machining methods—

Bullard Cut Master meets these conditions and one customer states: "You can do more with a Bullard than you can with——."

In this same customer's plant, a Bullard installation is showing a nice 40% savings over the previous method.

This is only one of many instances where Cut Master lives up to its name.

These machines provide maximum shop efficiency and answer the question, "How to make the Invested Dollar Pay More?"

On request we will be pleased to furnish you with a copy of Mapi Replacement Manual.



If you have hidden costs which are paying for a Cut Master, why not investigate and then have a Cut Master in 30", 36", 42", 54", 64", or 74" size.

THE
BULLARD
C O M P A N Y
BRIDGEPORT 2,
C O N N E C T I C U T

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 62

for countersinking holes $\frac{3}{8}$ in. dia and larger, is available in capacities ranging from $\frac{3}{8}$ in. to 1 $\frac{1}{2}$ in. across the mouth. Use of the tool in the Boeing-Wichita plant is said to have reduced the time required to countersink $\frac{3}{8}$ in. holes in 75ST aluminum from 3 $\frac{1}{2}$ minutes to 35 seconds.

P-77—Shorter Lift Truck

The Yale & Towne Mfg. Co., Phila. Div. has produced a new "Stubby" Worksaver a full six in. shorter than previous "walkie" models of the same type. The six in. saving has been ef-



Yale & Towne "Stubby" Worksaver lift truck

fected between the battery box and front edge of the truck thus retaining full platform lengths for handling skids and skid bins. The shorter design makes this type truck even more adaptable for handling skids and skid bins in such confined areas as freight cars, truck streets, narrow aisles and elevators.

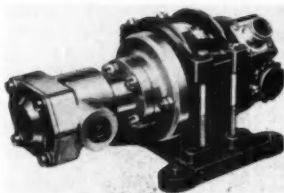
The truck is available in 4,000 and 6,000 lb. capacities. Standard platform lengths range from 36 to 72 in. in six inch increments. Heights of 6 in., 7 in., 9 in., 10 in., and 11 in. are available for handling skids of different heights. Platform widths are available in 19 in., 24 in., and 26 in. sizes.

Lifting is accomplished by hydraulic mechanisms. Twin hoist cylinders are equalized for uniform lifting of loads with conservative oil pressures. A solenoid operated lowering valve with built-in flow regulation gives controlled lowering for cushioning action upon descent of load. An overload relief valve is built into the solenoid unit to protect the hydraulic system against excessive pressures.

P-78—Dry Air Motor Driven Pump

New motor driven dry air pump, Model C-10350, announced by the Aro Equipment Corp., Bryan, Ohio, is an integral unit with an electric motor driving a vane type positive displacement rotary air pump.

The pump delivers $\frac{1}{2}$ CFM, having
(Turn to page 70, please)

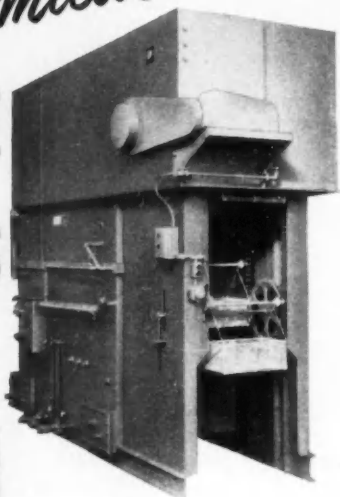


Aro motor driven dry air pump, Model C-10350



BLAKESLEE SOLVENT VAPOR DEGREASERS

USE LESS
SOLVENT



BLACOSOLV
Stabilized Degreasing
Solvent — one price,
one solvent for all metals

NIAGARA
Metal Parts Washers
for use with cleaning
compounds on either
batch or production jobs.

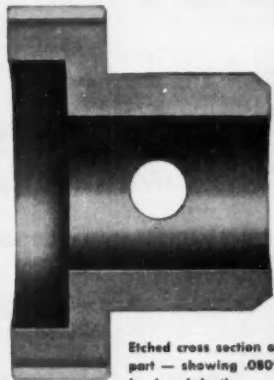
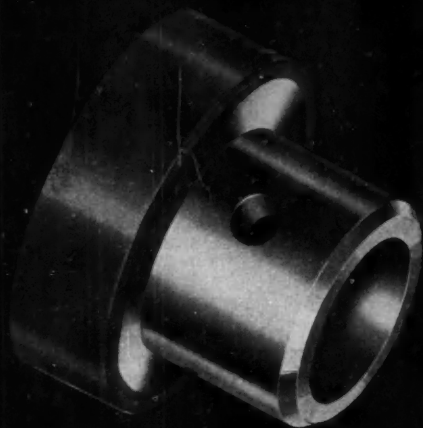
Blakeslee Solvent Vapor Degreasers USE LESS SOLVENT because of the patented construction and operational features. Metal parts are made chemically clean and dry in just a few seconds. Save time, labor, rejects with a Blakeslee Solvent Vapor Degreaser. A Blakeslee engineer-trained representative is available to solve your specific degreasing problems.

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COSTS CUT

94%



Etched cross section of part — showing .080" hardened depth.

with TOCCO* Induction Heating

A cost reduction of 94% resulted when heat-treatment of this Corn Harvester part was changed from carburizing to TOCCO-hardening. Look at the unit cost breakdown:

CARBURIZING

Degrease	\$0.0020	<i>eliminated</i>
Carburize	0.0200	<i>eliminated</i>
1st quench	0.0150	TOCCO, heat and quench \$0.0060
2nd quench	0.0150	<i>eliminated</i>
Draw	0.0050	<i>eliminated (self-draw)</i>
Shotblast	0.0035	<i>eliminated</i>
Internal Grind	0.0243	<i>eliminated</i>
External Grind	0.0166	<i>eliminated</i>

\$0.1014

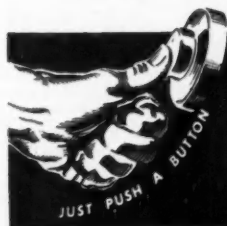
TOCCO-Hardening

\$0.0060

"—Savings of 9½ cents per piece—\$4770.00 on each 50,000 piece batch, plus an hourly production increase from 120 to 300 pieces per hour, plus improved quality of the product by virtue of the deeper case and stronger core."

Have you investigated TOCCO's cost-savings possibilities for your hardening, brazing, melting or forging operations? Why not write us today or send blueprints of your parts —no obligation, of course.

THE OHIO CRANKSHAFT COMPANY



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Please send copy of "A TOCCO Plant Survey—Your Profit Possibility for 1950".

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Company _____
Address _____
City _____ Zone _____ State _____

NEW PRODUCTS for AIRCRAFT NEW

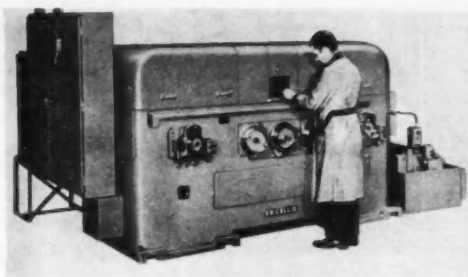
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U-20—Form Grinder For Jet Engine Blades

For high production processing of jet engine aircraft blades, the Ex-Cell-O Corp. of Detroit has designed and de-

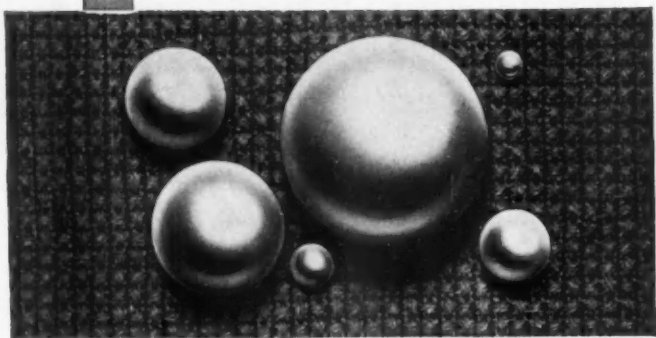
Ex-Cell-O precision
two-wheel form grinder
for jet engine blade
roots

veloped a new precision two-wheel form



IN

size and spherical accuracy
perfection of surface
uniformity—dependable physical quality



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And the service results from every Strom metal ball prove it—not only in the finest precision ball bearings but also in the lot of other ball applications where Strom balls are doing the job better.

Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.

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grinder. The machine uses two 24-in. diamond dressed grinding wheels which finish both sides of the root form simultaneously. Dovetail or pinetree forms of various sizes may also be ground. Automatic functions and simple controls permit unskilled operators to do precision work.

The blades are held in fixtures which are removable from the machine and may accommodate one or two blades, depending on size. The operator places the loaded fixture on the machine slide, presses the "clamp" button, then the "start cycle" button. While one blade is being ground he can remove a finished blade from another fixture, reload the fixture and check the finished part.

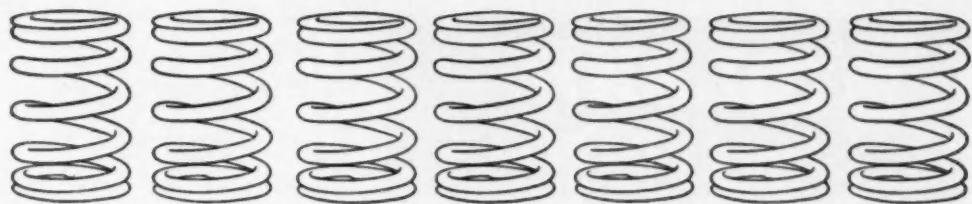
Meanwhile the automatic machine cycle moves the part to the grinding wheel, reciprocates it between the wheels for a predetermined number of strokes and speed. At the end of each stroke or alternate strokes, the grinding wheels feed toward the work at a predetermined amount until the finish size is reached. The machine slide then returns to the forward position, the fixture is unclamped and the feed mechanism is reset for the next cycle.

U-21—Pre-Assembled Push-Pull Controls

An improved line of pre-assembled and pre-formed Push-Pull controls for efficient transmission of motion, is being manufactured by the Industrial Division of Simmonds Aeroaccessories, Inc., Tarrytown, N. Y.

Basic elements of the Push-Pull control are a moving member, or linkage, enclosed in either a rigid or flexible casing, or a combination of both. Two types of linkage are available, a No. 4 (1/4 in. OD) light duty control for light aircraft and industrial application, and a No. 5 (5/16 in. OD) and a No. 7 (7/16 in. OD) for combined accuracy and strength. The wide variety of fittings and attachments available with these controls in many instances have been designed into machinery to transmit cycling motion.

Standard end fittings available are sliding rods (threaded, plain and hooked ends); clevis ends; quick detach coupling units; ball and socket end fittings; radian units; (converting
(Turn to page 70, please)



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to know . . .

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and ANN ARBOR, MICH.

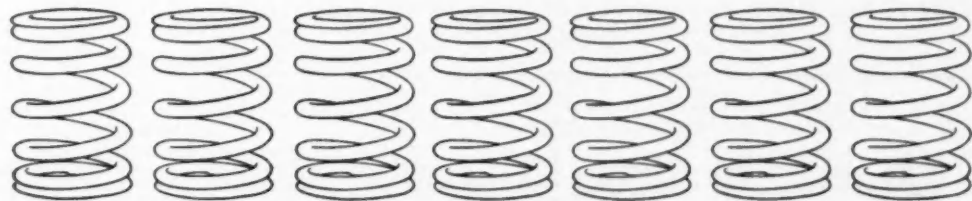
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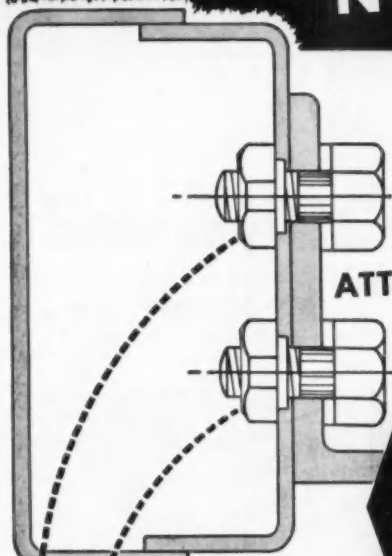
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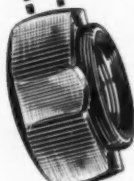
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for
**EASIER
and
FASTER
ATTACHMENT
of METAL
PARTS**

Particularly
Useful in
"BLIND
SPOTS"
Like This

ENGINE
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● In concealed and hard-to-reach places like the example above, Midland Welding Nuts speed assembly and help materially to lower production costs.

Because they are self locating, Midland Welding Nuts assure accuracy. Collar on nut locates into pierced hole in receiving member. No locating pins or fixtures are necessary.

Midland Welding Nuts may be the answer to some of your production problems. Write, wire or phone us today for complete information.

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Air and Vacuum
POWER BRAKES



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Electro-Pneumatic
DOOR CONTROLS



NEW PRODUCTS

For additional information please
use coupon on page 62

(Continued from page 66)

an inlet suction of 4 in. mercury and an outlet pressure of 1 in. mercury. The pump requires no external source of lubrication as is said to be common with standard aircraft vacuum pumps. Thus no oil fumes are emitted to the atmosphere—a feature of interest to the aircraft industry for applications such as pressurizing the radar chamber. It is also of interest to the chemical industry and others wherein oil free air is desired for many applications.

Modifications of this basic design for operations at greatly increased suction and for higher or lower capacity ratings are merely a function of tolerances and basic sizes. The electric motor on this unit is designed to Specification AN-M-10a.

The pump is designed to operate satisfactorily throughout an ambient temperature range of from minus 65 F to plus 140 F. Operation of this motor driven pump under extreme cold conditions could be recommended if a suitable desiccator were installed in the inlet line to dry the air. If operation is being considered for room temperatures only, then the desiccator is not necessary.

Endurance of the unit is checked by rigorous tests for a total period of 150 hrs under the following operation conditions: (1) 130 hrs total—run at ambient temperature 70 F; (2) coldsoak at minus 65 F for 24 hrs; (3) remove and immediately check for starting under extreme low temperature condition; (4) 20 hours total—run at ambient temperature 70 F.

New AIRCRAFT PRODUCTS

For additional information please
use coupon on page 62

(Continued from page 68)

linear to rotary motion); friction locks (for locking control in any position of its stroke); adjustable friction heads (for varying control resistance to movement) and a vernier head for combining adjustable friction head and friction lock functions and providing vernier adjustment.

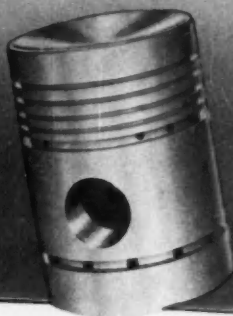
When tested under temperatures ranging from minus 72 F to 160 F these controls are declared to have been unaffected over tens of thousands of cycles. Controls are lubricated for approximately a million cycles.



Air Craft



Nelson
Auto-Thermic



Diesel



Trans Slot



Light



Heavy Duty



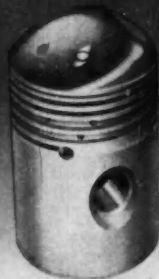
Wing Insert



Two Cycle



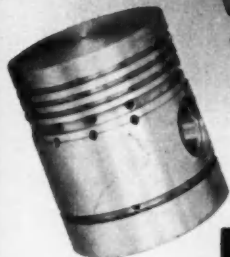
Steel Truss



Turbulator head



T-Slot



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Manpower and Materials Discussed at Drop Forge Meeting

Manpower problems facing industry were posed by R. C. Goodwin, director, Bureau of Employment Security, Dept. of Labor in his talk before the special industry meeting of the Drop Forging Association held in Cleveland, Sept. 14 and 15. Considering that the U. S. has been enjoying the highest record of employment known in this country, and coupling this with fact that there are less than two million unemployed at the

present time, it is obvious that manpower will be a serious problem what with the incidence of the \$30 billion defense spending program.

Since occupational shortages are bound to develop from now on, not only because of the industrial program, but also due to the drain of Selective Service requirements, the Labor Dept. urges resumption of war-time training programs as well as the employment

of women and older people. Having in mind the many furloughs of essential workers to industry during the last war, Labor has taken the occupational approach to industrial employment, and has prepared a tentative list of critical occupations deserving consideration for deferments from military service. This list has been presented to NSRB and the Defense Dept.

Col. R. H. Howard, chief, Office of Procurement Methods, Munitions Board, cited improvements made in procurement methods of the military services, and pointed out that short cuts will be effected through authority to negotiate contracts as a result of the new regulations. One of the major platforms of the Munitions Board is a recognition of the major role of small business and efforts are being made to encourage small business.

Col. Howard mentioned that there are about 325,000 manufacturing plants in the U. S. A., about 99 per cent of these being small business, the latter being defined as employers of less than 500 persons. The Munitions Board has established a Small Business Office through which daily reports on all bids for government work will be cleared through field offices of the Dept. of Commerce.

Establishment of the National Production Authority, with William Henry Harrison as administrator, points up a developing pinch on critical materials—alloys, chemicals, and steel. Commerce Secretary Sawyer recently announced that various divisions of Commerce have been transferred to NPA to facilitate its work. In any event it appears that NSRB no longer will have direct contact with industry. One saving grace in the situation is that NPA is presumed to operate on the premise that no rules or regulations will be placed in effect without consultation with Industry Advisory Committees and specified trade associations.

At the present time speculation is rife as to the course of steel allocations. Although it has been estimated by automotive industries spokesmen that the military program should take much less than 10 per cent of going steel capacity, it is pointed out that defense will require about 4.1 million tons while the railroads claim a need for about 5 million tons during the next two years. With current steel activity for civilian needs around 100 per cent, and maximum capacity around 100-million tons, it is obvious that anything taken for the military program will come out of the hide of civilian production.

According to a report presented at the meeting, the commercial drop forging industry (excluding captive forge shops) had on its books in the period January through July, 1950, 87 per

(Turn to page 90, please)

To make **HARDENED & GROUND PARTS** Requires EXPERIENCE!

NOTHING we make tells a more complete story of quality than the king pin shown here—involving expert knowledge of materials; close-limit, intricate machining; scientifically controlled heat treatment; and micro-finish grinding. Result: A product in which both automotive manufacturers and ultimate users can have the utmost confidence.

Our specialization of over 40 years has earned us many satisfied customers among makers of trucks, tractors, trailers, buses, axles, off-the-road machines, and Diesel locomotives.

We would like to have you consider Brown Hardened and Ground Parts for your own requirements. Please write or wire.

Henry W. Brown
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Parts include . . .
King Pins
Shackle Bolts
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. . . anything in the
hardened and ground
line, of any analysis
steel, up to 4 1/4" diameter.

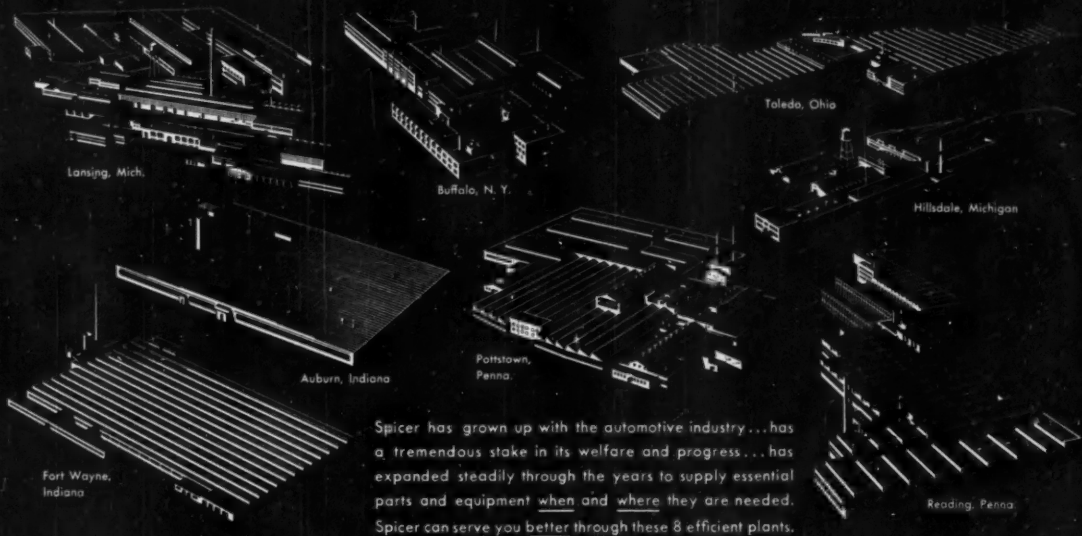
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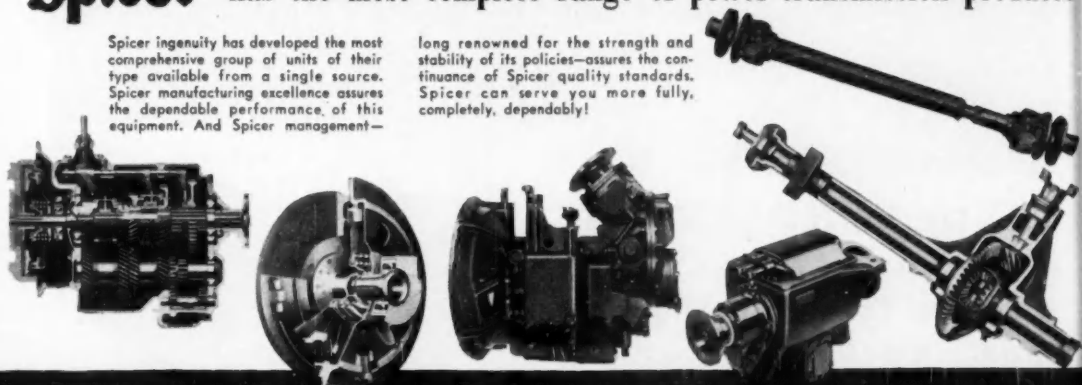


Spicer has grown up with the automotive industry... has a tremendous stake in its welfare and progress... has expanded steadily through the years to supply essential parts and equipment when and where they are needed. Spicer can serve you better through these 8 efficient plants.

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Spicer ingenuity has developed the most comprehensive group of units of their type available from a single source. Spicer manufacturing excellence assures the dependable performance of this equipment. And Spicer management—

long renowned for the strength and stability of its policies—assures the continuance of Spicer quality standards. Spicer can serve you more fully, completely, dependably!



Spicer engineering has set the standards for the industry

Nowhere in the nation is there assembled such an impressive group of specialized engineering talent as at Spicer. During the past 46 years, Spicer has worked hand in hand with the manufacturers of every type of automotive vehicle... employing every type of power... and using every power transmission principle. Look to Spicer for engineering assistance and manufacturing competence that will build greater prestige for your product.

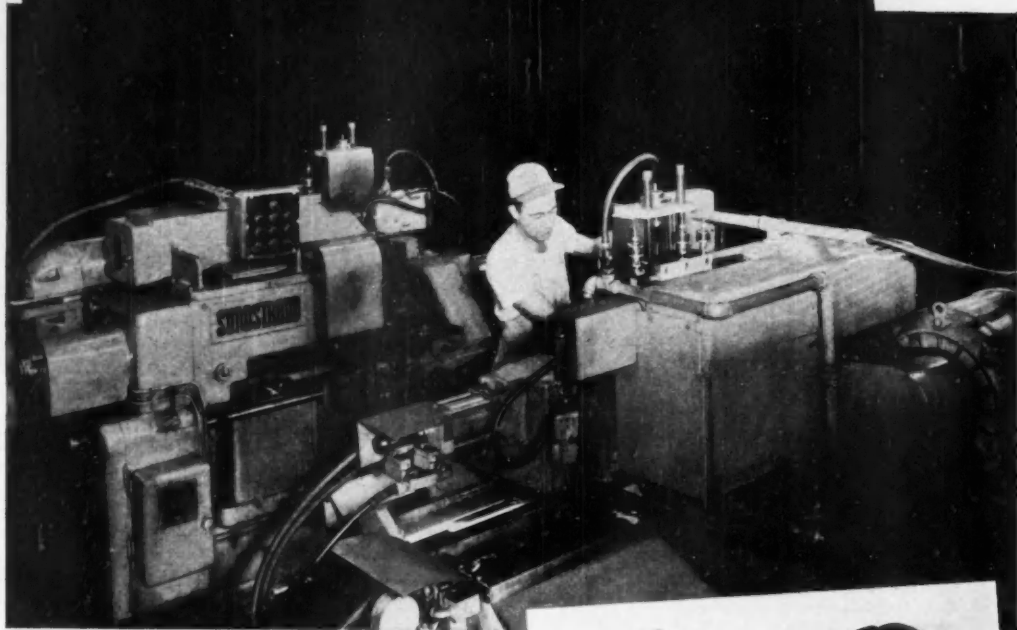


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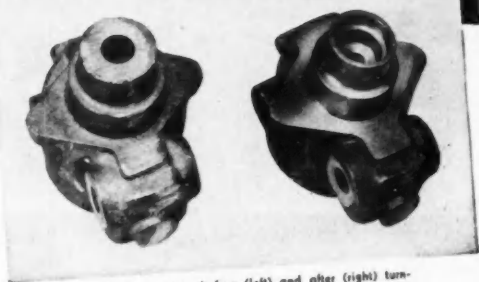
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PROPELLER SHAFTS • SPICER "BROWN LIPE" GEAR BOXES • RAILWAY GENERATOR DRIVES

Production Increased From 40 to 132 Pump Bodies Per Hour



.....On **SUNDSTRAND** **Automatic Lathes Using** **Multiple Tooling and Auto-** **matic Cycling**

Here's fast, profitable machining of a pump body part requiring turning, facing, chamfering, drilling, and counter-boring operations. All are performed on a Model 8A Sundstrand Automatic Lathe with multiple tooling and automatic cycling. Two of many features contribute to the efficiency of this installation. First, the machine is automatic and completes a rough and finish cycle once started by the operator. This enables one operator to run two machines and produce 132 bodies per hour instead of 40 per hour as obtained with the previous equipment and method. Second, indexing of the in-

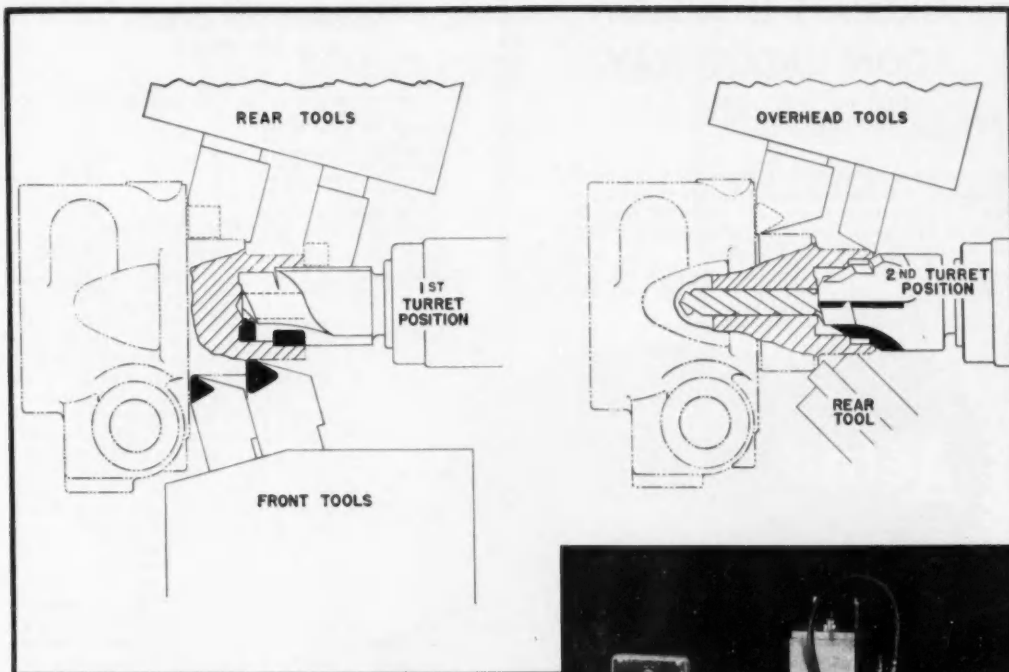


Pump body castings before (left) and after (right) turning operation on Sundstrand Model 8A Automatic Lathe.

sert type tools is fast and accurate minimizing time out for changing tools. Other features of this and all Sundstrand Automatic Lathes include simplicity of setup and quick changeover which make it possible to turn both long and short run work profitably. It will pay you to investigate these features. Further, have Sundstrand engineers assist you with tooling recommendations. There is no obligation for this service.



RIGIDMILS • FLUID SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT



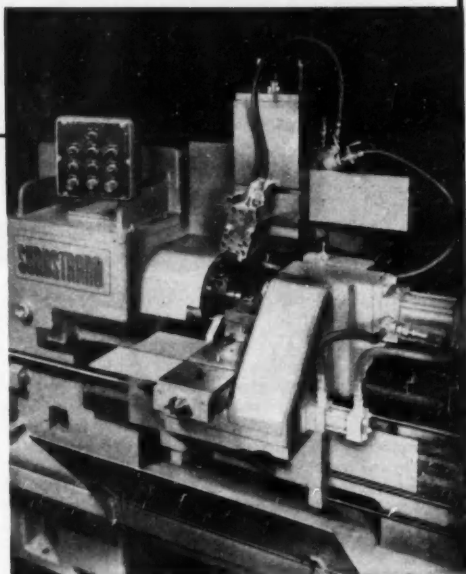
Eleven Tools Work Automatically To Rough and Finish Critical Surfaces

The tooling diagram illustrates the number and type of tools used on this job. The illustration to the right shows the position of the overhead slide and turret. The machine cycles twice automatically with automatic indexing of turret to finishing position and automatic re-setting of front slide tools to depth for finish turning cut. Machine has two speed motor which automatically steps up to high speed for finishing cut.

If you have turning operations in your plant, it may pay you to consult a Sundstrand engineer. He may be able to combine operations for faster and more profitable machining.

FREE Additional Data

This new booklet will give you complete engineering data on the new Sundstrand Model 8A Automatic Lathe. Typical turning jobs and physical dimensions are included. Write for your copy today. Ask for Bulletin No. 200.



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DRILLING AND CENTERING MACHINES

SPECIAL MILLING AND TURNING MACHINES

AIRCRAFT INDUSTRY BOOM UNDER WAY

(Continued from page 39)

quality of equipment as that possessed by Great Britain. Therefore, it was brand-new jet fighters or nothing and the U.S. plans the production and delivery of about 1600 new jet fighters to these European nations as quickly as they can be produced.

The over-all picture, then, is a program for about 7500 aircraft costing \$7.5 billion in the next 18-24

COMPOSITION OF THE U. S. AIR FORCE

Combat Group	August, 1949	Economy Cuts June, 1950	Planned
Heavy Bomber (B-36)	2	3	5
Medium Bomber (B-28, B-50, B-47)	13	12	15
Light Bomber (B-45)	2	1	4
Day Fighter (F-80, F-84, F-86)	20	17	21
All-Weather Fighter (F-49, F-84)	3	3	5
Tactical Reconnaissance (B-50, B-47)	1	1	5
Strategic Reconnaissance (B-36, B-29, B-50)	6	5	5
Troop Carrier (C-54, C-82, C-119, C-124)	7	8	9
	54	48	69



Since its introduction in 1934 the Aetna T-type clutch release bearing has enjoyed the pronounced and uninterrupted preference of the majority of America's car, truck, bus and tractor manufacturers. Its impressive record stems from these vital and unique features which end all the troubles common to conventional type bearings:

- prelubricated for life—designed with exceptionally large grease reservoir, factory packed with the best lubricant obtainable.

- permanently concentric—patented, one-piece T-type retainer locks balls and races in perfect alignment, eliminates eccentric thrust, noise and excessive wear.

- oil-filled bronze retainer—improves lubrication, assures the extra smoothness, quietness and endurance of bronze-to-steel contact.

- time proven—service tested for 16 years under every conceivable operating condition encountered by automotive vehicles.

Write for complete information and testings samples.

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Aetna

T-TYPE Clutch Release BEARINGS
WITH THE... T... THAT TAMES TROUBLE

months, or a threefold expansion of the U.S. aircraft industry. It was the size of this program that touched off the wave of excitement in the vicinity of aircraft manufacturing plants. As many as two thousand job-seekers showed up in a single long line outside the aircraft factories and of this total some 50 were hired. This is the measure of the industry's pace at this time.

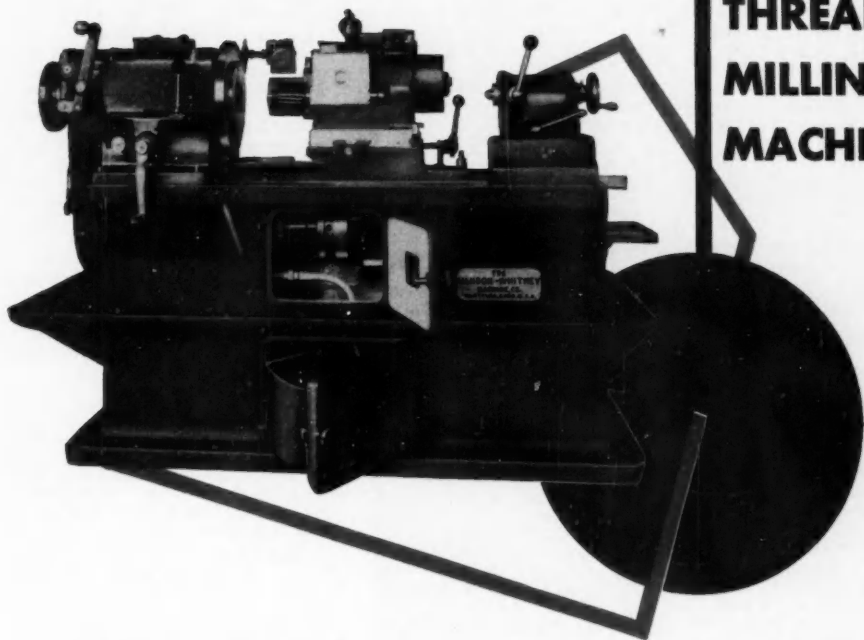
The fundamental factor dictating a slow and well-controlled expansion of the industry is the simple fact that it is, and has been, operating far, far below capacity since V-J Day. Therefore, it is elemental that the industry can increase its output by a factor of two without any major increase in employment or activity level and by a factor of three by a major employment increase but no increase in tooling, production facilities or plant expansion. Orders placed to date have, without exception, been simply for additional quantities of aircraft models already in production and a request for an increased rate of the order of 50 per cent.

Industry hiring is wholly on the basis of skilled, experienced workers. Employment at the time of the Red Korean attack totalled 254,800 and the Aircraft Industries Association estimates this will climb to about 500,000 by this time next year, a doubling of employment to be sure but one spread out over 12 full months. The industry, at this time, is definitely avoiding the hiring of unskilled or even semi-skilled workers due to the necessity for instituting training programs for the new workers. Such training programs, lasting from two to ten weeks, were all right back in 1940 when the learners were paid 50¢ an hour but the new minimum wage of \$1.05 an hour under the recent Walsh-Healy Act decision makes a large-scale training program an expensive proposition.

Neither the industry nor the government is interested in overtime payments at this time, except in temporary and localized situations. For example, Convair is currently using two 10-hr shifts on a six-day week basis for the addition of turbojet engines to its B-36 bomber at San Diego but this is an emergency modification. Not only does the industry want to avoid the inflationary effect of large overtime payments but its postwar experience indi-

PERFECT THREADS external or internal
NO SPOILAGE with

**Hanson-Whitney
THREAD
MILLING
MACHINE**



Today's requirements for low cost, perfect threading of so many, so varied and such costly metal parts make it necessary that work spoilage be eliminated.

The "Milling Process" . . . and, in particular, the Hanson-Whitney Semi-Automatic Thread Milling Machine . . . gives you 100% perfect threads. And it produces at high speeds on many materials, otherwise difficult to machine.

Because of the Multiple Cutter principle used, threads of varied lengths are completed in one revolution of the work. Threading may be right

or left hand, external or internal, straight or tapered. All operations are automatic except insertion and removal of work.

Three machine sizes permit External Threading from $\frac{1}{4}$ " to 10" dia.; Internal Threading $\frac{3}{4}$ " to 10" dia. The size pictured above (the largest) has a capacity of 10" dia. x 24" length.

For low-cost, perfect threading select the H-W Thread Miller . . . a standard of highest quality throughout the industrial world.

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cates, as elsewhere, that the standard eight-hr, five-day week is the most efficient arrangement anyway, worker productivity dropping off with increases in these hours.

Generally, the new business does not disturb the existing proportions in the industry; the little companies got little orders, the big companies big orders. Air Force has listed the 14 major prime contractors in the new program as: Bell, Boeing, Convair, Douglas, Fairchild, Lockheed, North American, Northrop, Piasecki, Republic, United Aircraft (Pratt & Whitney, Hamilton Standard, Sikorsky), Allison Division, General Electric Corp. and

Wright Aeronautical Corp. Missing from this list are the Glenn L. Martin Co. and the Airplane Division of Curtiss-Wright, neither of which hold USAF production contracts. The work that Bell is to do under the new program has not been announced but it also holds no combat aircraft production contracts. Navy's business is with Douglas, Lockheed, North American, Piasecki, United Aircraft (Chance Vought Division), Westinghouse, Wright Aeronautical and, of course, its old standby Grumman. Navy has placed repeated new contracts with the Glenn L. Martin Co. for the new P5M Marlin flying boat.

Orders for increased aircraft production always bring a reaction in aluminum markets and the 150 million airframe lb contained in the new program is virtually all aluminum. Current yearly U. S. aluminum production of 1300 million lb indicates no serious dislocations as a result of the new program, particularly in view of current moves to increase this output. In the bauxite field, the government has completed arrangements for the purchase of about 400 million lb of raw metal from Aluminum Ltd. of Canada to be delivered over the next three years for an estimated \$75 million. In addition, loans have been made to Reynolds Metals and Jamaica Bauxites, Ltd. to finance mining operations in Jamaica. Fabricating activity is well under capacity and the aluminum industry could handle twice as much business as it is doing now.

A program to provide a substantial number of machine tools has proceeded according to schedule with more than 161,000 general purpose machine tools now in storage. This will permit machine tool makers to concentrate on production of special purpose tools so critically needed in the event of full scale mobilization.

Hardest hit by the new program are the suppliers, many of which have gone on a virtual round-the-clock operation to meet the new demands. This stems from that old irritant of aircraft production: equipment lead time. Items that would normally not be available for 6-12 months must simply be accelerated to meet the new assembly schedules and the parts supplier, being on the end of the whip, must absorb all of the slack in his own plant. Most critical situation is in the electronics field, which was way behind schedule in the pre-Korean days. This situation obtained due to the large proportion of development work demanded by each new request from the industry and the fact that production volumes were quite small on most complex items. Their complexity further militates against any rapid expansion of output.

This supplier situation, easily the most critical in the new program, has brought to a head a long-smouldering problem. In the vast majority of cases, this equipment is purchased directly by the government and shipped to the contractor's plant as Government-Furnished-Equipment. The integration of the new high-speed fighters and bombers with their electronic equipment has brought a growing trend towards contractor procurement of highly specialized equipment and in many cases the contractor himself has become a designer and fabricator of this equipment. Prosperous commercial business in the past few years in this field, notably in television receivers, has forced electronic manufacturers to either refuse offers of government business or allocate it low priorities in its plants. Thus, there has long been a

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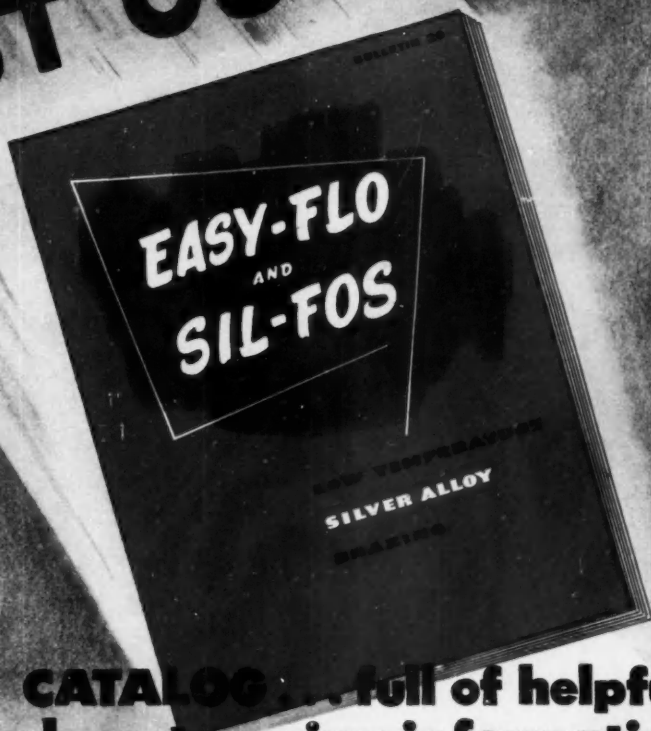
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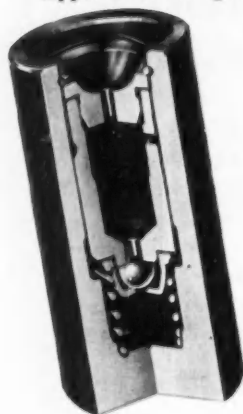
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DIESEL EQUIPMENT DIVISION

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struggle for the services to obtain the equipment they need. Aircraft manufacturers, on the other hand, have had much better success in obtaining the equipment they desire and there is strong industry feeling that the industry itself should assume a greatly increased responsibility for the purchase of this equipment. Individual manufacturers have found repeatedly that they could obtain lower prices and faster delivery dates by conducting negotiations themselves rather than going through the Air Materiel Command at Wright Field. With GFE equipment amounting to roughly one-half of the total cost of a combat aircraft, it will be important that this \$3.5 billion be administered in the most efficient way.

Hidden factor in the new program is the doubled complexity of the aircraft now being procured over their World War II counterparts. A common example is in skin gages, which have increased from an example 0.050 in. to 0.250 in. in similar locations, and the growing use of machine-tapered and rolled-tapered skin plating which renders complex what was once a simple job. Large machined forgings are becoming common and the complexities of their shapes increasing. Instrument and control installation work has increased enormously in magnitude and complexity, demanding the highest possible skill and ample time for checking and adjustment. These and similar increased complexities double the numerical magnitude of the production job ahead.

It is because the industry must keep its eye on two targets simultaneously that it is going slow on its new production increase. One of these is, of course, the comparatively simple job of increasing the output of current models. But more complex is the gearing of this increase into a future demand (which all industry leaders are convinced is inevitable) for a meteoric increase against time. This dual-purpose expansion requires walking a tightrope between holding current expansion to the minimum set by the numbers issued by the government and a maximum expansion against a future requirement. The new long-range procurement program announced by the services provides an invaluable gage against which this expansion can be measured but there exists no gage for the job ahead in an all-out intercontinental atomic war for survival. The industries whole planning assumes no interference from air attack, no sabotage, no serious disruptions of materials supply.

For the moment, at least, the aircraft industry has simply moved into second gear without expansion of capacity or large-scale hiring. But industry leaders find persistent comparison between the foreign orders of 1940 that placed it in second gear for the hectic demands of 1942-44 and the cur-

(Turn to page 88, please)



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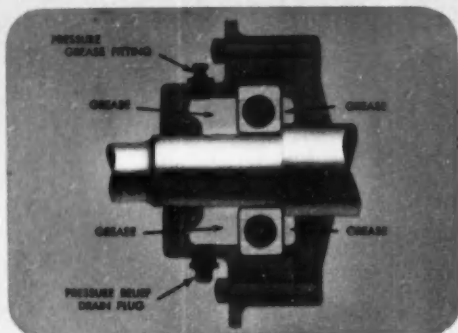
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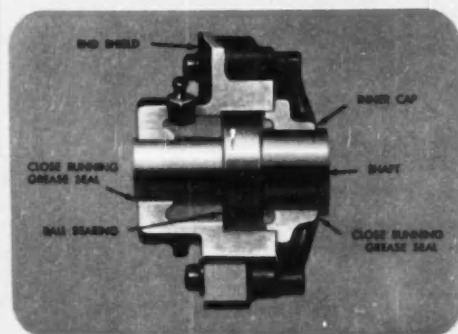
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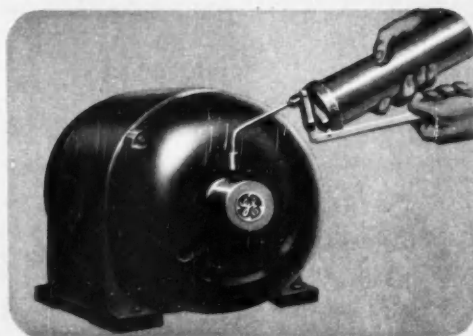
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GENERAL  ELECTRIC

752-3

Hydraulic Dynamometer

(Continued from page 54)

to keep the dynamometer water from getting too hot is calculated from the greatest horsepower which the engine is capable of developing and the desired rise in temperature of the water in the dynamometer and cooling coils.

In fixing the upper limit for the temperature of the dynamometer water, it is well to remember that the holding power falls off with a decrease in viscosity of the water and consequently with an increase of temperature. Perfectly reliable tests have been run with this temperature as high as 165 F with no harm to the dynamometer. For heavy duty operation, it would be better to limit this upper temperature to 140 F. The temperature of the entering cooling water is obviously fixed by the nature of the water available. In the test results shown here, the water used was under city pressure and came in at about 58 F.

Fig. 2 shows the actual temperature recorded for a test on the 16 in. dynamometer. In the diagram, the symbols are as follows:

T_{do} = temperature of dynamometer water leaving rotor.

T_{di} = temperature of dynamometer water entering rotor.

T_{co} = temperature of cooling water leaving coils.

T_{ci} = temperature of cooling water entering coils.

The test engine was run at wide open throttle and the speed was controlled by the dynamometer load. The most significant feature of the curves is the fact that the temperature of the cooling water leaving the coils is exactly the same as the temperature of the dynamometer water which has passed over the outside of the coils. Since these two values are equal, the logarithmic form of mean delta t cannot be used and consequently the arithmetic mean temperature difference has been employed in finding the coefficient of heat transfer. Another reason for using the arithmetic mean is that there is neither parallel nor counterflow in the heat exchanger, but a mixture of both.

The coefficient of heat transfer also has been plotted in Fig. 2. Under ordinary circumstances the curve should be a horizontal straight line, but in this case, the cooling water supply to the engine was taken from the same water lines that served the dynamometer. Consequently, as the load on the engine increased, more cooling water was needed and this cut down on the amount which went through the dynamometer cooling coils. This caused a variation in the velocity in the cooling coils of 0.5 to 0.8 fps. Another variation in the cooling water supply was caused by use of water in the laboratory and throughout the building.

At very low speeds, the dynamome-

ter water does not leave the rotor with sufficient velocity to circulate properly around the cooling coils. This gives very erratic values of the coefficient U but does no harm to the dynamometer nor does it affect the accuracy of the determination of torque. For the purposes of design, interest centers in the values at maximum speed and power, so the points at the low speed end have been ignored. From Fig. 3 the value

for U is in the neighborhood of 600.

The horsepower absorption by a dynamometer of this type when completely filled with cool water is $H = aN^n$, where H = horsepower; a = A constant; N = rpm; n = an experimental constant = 2.92.

Plotting the results of the test on the 16 in. dynamometer when used with variable amounts of water to absorb the horsepower available in an engine at a given speed, it is found that the same equation holds but with different values for a and n . As shown in Fig. 3, n , the slope of the curve is equal to 0.796. This shows that the dynamometer which is designed for the lowest

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speed and is nearly full of water at that speed is capable of absorbing a great deal more horsepower at higher rpm than the engine is able to produce. Consequently, a dynamometer designed for a slow speed engine may be used also on a higher speed prime mover of much greater power.

Indicated horsepower and friction horsepower of an engine may be obtained with this dynamometer by shorting out one spark plug on a gasoline engine and by shutting off the fuel supply to one cylinder on a Diesel and balancing the dynamometer with the remaining cylinders firing. From these data, the ihp of one cylinder may be calculated.

Track-Laying Vehicles

(Continued from page 45)

Tanks Since 1916" by Jones, Rarey and Icks. In this type, as in a band saw, it is necessary that the wheel diameter be great enough so that the difference between the outside and inside radius of the band as it passes over the wheel does not stress the band above the fatigue limit. With single thickness bands this limits the application. Fig. 7 shows an experimental multiple band track designed for a 40,000 lb amphi-

bian. Two bands are used, and between them is a layer of synthetic rubber. Hardened steel driving lugs A, and cast aluminum alloy water pumping grousers B, are cycle-welded to rubber pads and clamped by through bolts which have self-locking threads. This type track is strong and light. Its efficiency and life are not known. It would be more efficient if the pitch line of drive was on the center of the band.

Tracks for amphibians are always a compromise. They must meet all the conditions of land operation and also provide propulsion in water. Rubber bushed designs give good sealing against the corrosion of sea water. Steel-on-steel working surfaces must be sealed as effectively as possible in the space available. Grease lubrication through hollow track guides is practical.

In spite of considerable research work on models at the Universities of Michigan and Wisconsin, and California Institute of Technology, very little has been accomplished in improving the driving efficiency of these tracks in water. Fig. 8 shows a common type of water pumping grouser. This is about 50 per cent efficient forward, very inefficient in reverse. The experimental grouser shown in Fig. 9 is an attempt to improve reverse efficiency. Fig. 10 shows the Graham Y-type experimental track, which is somewhat more efficient in water propulsion. Its grousers have the added advantage of some water circulation through the track.

Optimum grouser spacing for amphibious operations is believed to be about eight in. In designing amphibious tracks, their displacement in relation to their weight must be considered. The buoyancy of some types is important.

The materials to use for tracks are determined by quantity to be produced and the conflicting desires for low cost, lightness, shock strength and efficiency. Owing to the considerable length of tracks there are usually many parts alike per track-layer; so the number of parts is large per 1000 track layers. For the track blocks alloy cast iron and cast steel, steel forgings, alloy steel stampings, rolled steel sections and aluminum alloy castings and forgings have been used successfully. It is practical to cast the holes for rubber bushings parallel, smooth, and to size within needed limits; but frequently it is cheaper to broach or ream these holes. All machine operations and heat treatments are typical of standard medium accuracy practice.

Pins are usually ground from alloy tubing. When they are highly stressed it is advisable to shotpeen the flats for fastening wedges. Parts for metal-to-



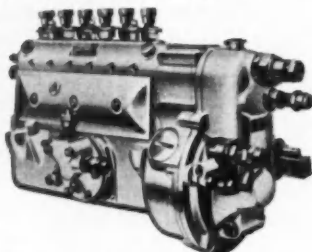
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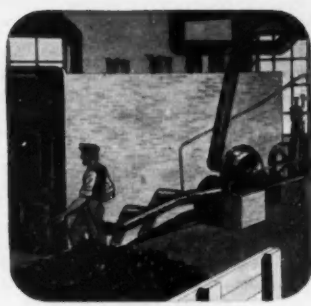
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1 1561—A crude, manually operated bellows like this was used in an attempt to pump fresh air into a mine in Switzerland. And man's quest for comfort, by putting air to work, was under way.

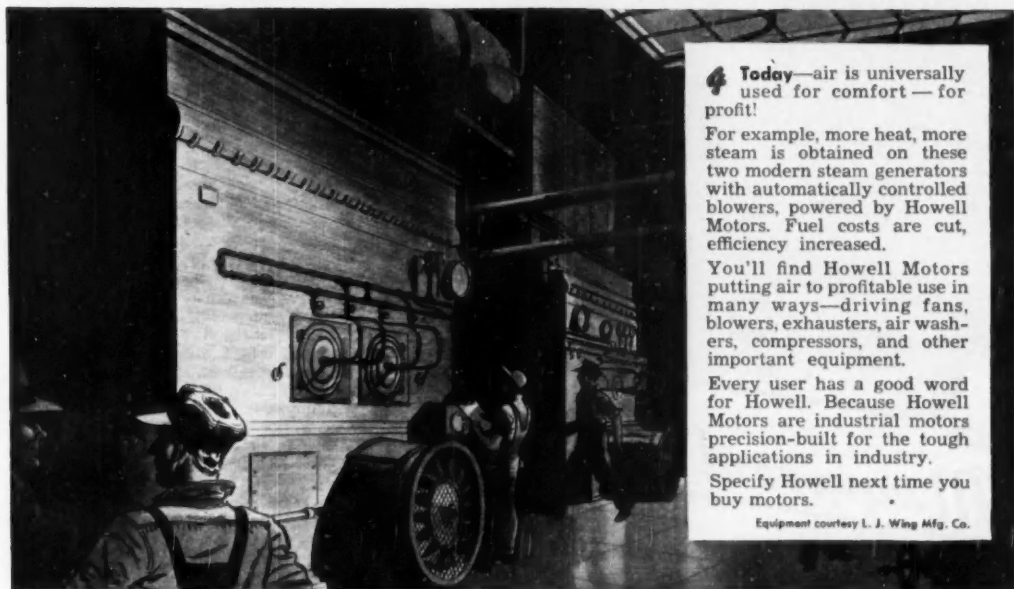


2 1700—This age-old method of moving air for its cooling effect was used in many parts of the world. Needed was a form of low-cost power that would move air mechanically, automatically, and efficiently.



3 1873—This steam-operated, forced draft fan promoted efficient burning of fuel in boilers. By 1915, Howell Electric Motors arrived. The era of electrical power put the handling of air on a paying basis.

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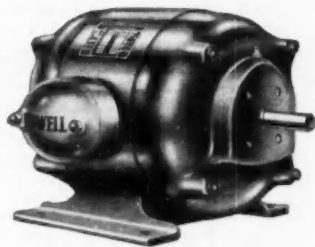
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metal pin joints are preferably nitrided or Tocco hardened, to resist sand abrasion.

Rubber bushings are often of natural rubber, having durometer hardness 60-67, and specific gravity 1.14-1.18. Rubber tread stock is similar to the best tire tread stock with specific gravity from 1.14-1.20. The constant development in rubber makes it advisable to contact leading rubber manufacturers when designing.

Ball, needle, and roller bearings can be successfully used to reduce pin friction. It is necessary to provide enough lubrication to prevent rust. The lubri-

cant should be under pressure and the bearing seals designed to let the lubricant out slowly and prevent the entrance of grit and water.

Bogie wheels vary from the small steel rollers used in track laying "crawlers" to the large-diameter wheels of Christie type suspensions. All the elements and practice of wheel design are similar to those used in any wheel subjected to comparable stresses. This applies to the wheel bearings, except their sealing and lubrication, which must meet track-layer operating conditions. Wheel diameter and spacing depends upon terrain over which most

efficient operation is desired and upon average and maximum speeds. For low and medium speeds in soft going many small wheels are advisable, to reduce the drag from catenary effects. For medium and high speeds over fairly hard to hard ground and highways large wheels are best. Whenever possible rubber tires should be used. Tire radial thickness should be from 1.75 to 2.0 in. Tire carrying capacity varies approximately as the square of wheel diameter; and increases with the exposed surface of the tire.

British Aero Display

(Continued from page 49)

Bristol featured the Proteus propeller-turbine which is under development for the giant Brabazon Mark II.

Undoubtedly the British move is towards the straight jet or the turboprop and away from the piston type engine. This year the number of piston engines in the show was 30, gas turbines 28, of which 19 were turbojets and 9 turboprops. In 1947 there were 47 piston engines, six turbojets and one turboprop. Average speed of all powered aircraft rose from 300 to 400 mph.

High spots were numerous and brilliant both for military and civil types. In many cases exact performance figures were withheld, but this did not render the display flights any less impressive. The English Electric Canberra B2 bomber, which has passed from the prototype to the production stage for the R.A.F., carried out aerobatics which only a few years ago would have been considered sensational for a fighter, this display including very impressive reversed climbs and double rolls. It has a span of 64 ft, length 65.5 ft, height 15 ft, 7 in., and is powered by two Rolls Royce Avon turbojets.

Notable jet fighters and interceptor planes were demonstrated but no figures were given. One of the fastest was the Hawker P 1081 which made its first flights in June of this year. Fitted with the Rolls-Royce Nene, it is probable that the more powerful Tay jet will be substituted.

Vickers Armstrong presented the experimental 535 fighter with a Rolls-Royce Nene turbojet. The Hawker Sea Hawk, a high-speed naval interceptor, was fitted with a single Rolls-Royce Nene, having intakes on the leading edge of the wing while, after the turbine, the jet pipe was bifurcated and led to exits on the wing roots. De Havilland demonstrated a night fighter with a Ghost turbojet, and another impressive night fighter was the Meteor NF 11, built by Armstrong Whitworth, and now standard equipment with the R.A.F. night fighter units. It is powered by two Rolls-Royce Derwent turbo-



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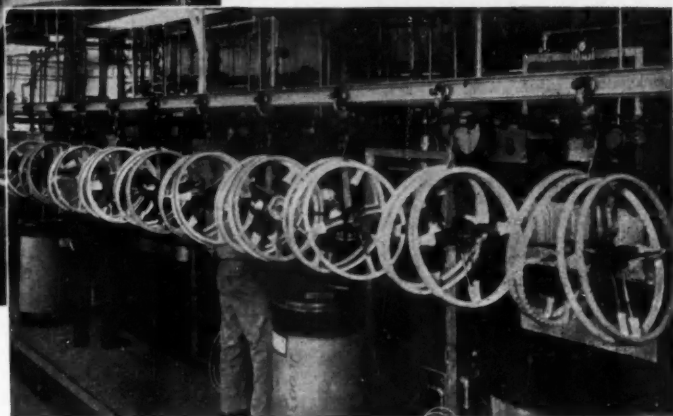
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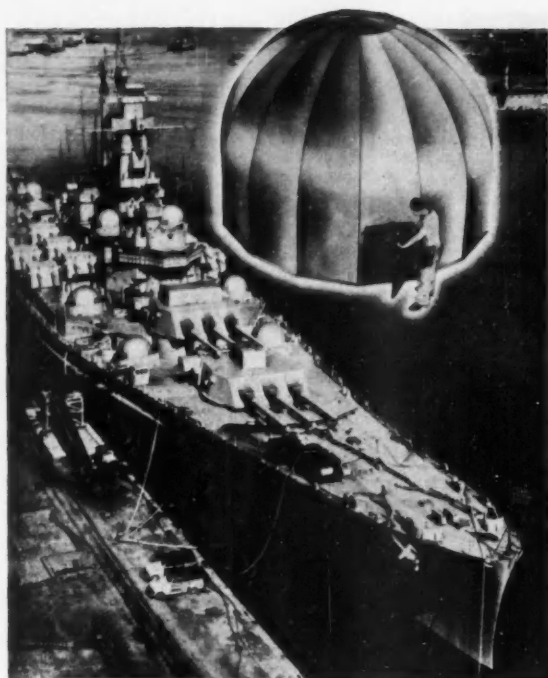
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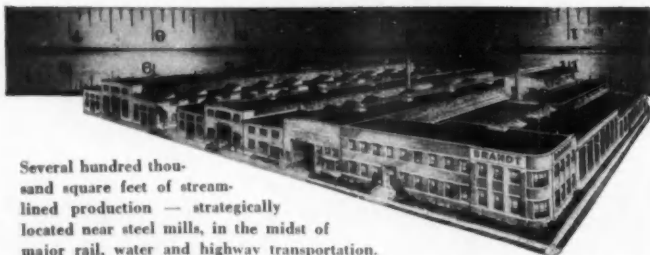
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jets. The latest Gloster was the Meteor 8, a single seater jet fighter having greater speed and higher performance than any of its predecessors and equipped with two turbojet Rolls-Royce Derwents.

Particular interest centered around the De Havilland Comet jet airliner by reason of the speed with which it has gone through its very successful trials. This is the second machine to be built and a third should be flying before the end of the year. It is believed that this world's first jet liner will enable the B.O.A.C. to get out of the red. Vickers Armstrong showed the Tay-Viscount turboprop liner, with four Rolls-Royce engines. This machine has been in regular service on the Paris-London route. Known as the 700 series, planes of this type are about to go into regular service with B.O.A.C. and B.E.A.

The Handley Page Hermes V, developed from the Hermes IV, was another of the British turbine airliners. With a capacity for 40 to 74 passengers, the Hermes V differs from its predecessor by having four Bristol Theseus turboprops of 2820 hp giving it a cruising speed of 330 mph. It has a higher payload and the increase in weight is estimated at 8000 lb.

Although displayed, the giant Brabazon was not demonstrated. Experimental work on this machine has been slow. Up to the present it has only received certificates in the experimental category and is not yet allowed to carry even non-paying passengers.

An outstanding freighter was the Blackburn & General 15-ton Universal Freighter having a cruising speed of 175 mph and a take-off ability of only 585 yd. It is a high-wing monoplane powered by four Bristol Hercules engines. Cargo space is 5760 cu ft.

The conclusion from a Farnborough visit is that the competition is no longer between piston and jet engines for fast fighters and airliners but between straight jets and turboprops. The success achieved by the Comet is a strong argument in favor of the former, but the Hermes V, the biggest propeller-turbine liner in the world, is equally impressive.

In addition to engines and planes, a large number of accessories were exhibited. Test equipment and testing method as well as special production equipment were displayed and, in some instances, were demonstrated.

AIRCRAFT BOOM

(Continued from page 80)

rent shift into a post-Korean production level. They hope fervently, with all U. S. citizens, that we are not now in a pre-World War III preparation stage—but if future events prove that to be true they do not want to have been unprepared.

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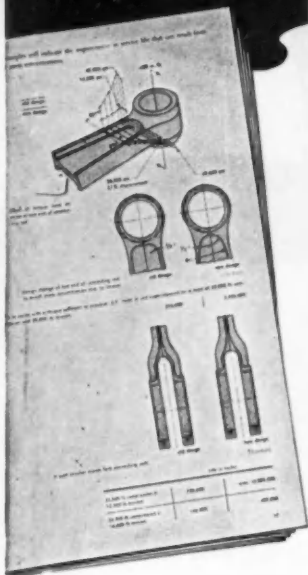
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Manpower and Materials

(Continued from page 72)

cent more business than in the similar period in 1949. Total shipments for the same period were 495,000 tons, up eight per cent over the same period last year, with a total shipment exceeding 800,000 tons anticipated this year.

The increasingly important role of cast steel shot in the cleaning of forgings was outlined by Nelson S. Mosher, Alloy Metal Abrasive Co. He cited economies in replacing cast iron and malleable shot, pointed to the continuing studies by the SAE committee on peening and metal cleaning in an effort to improve practice and effect greater operating economies.

An interesting feature was the showing of a Technicolor film, "This Moving World" by the Malleable Founders' Society. The pertinent aspect of this film is its accent on automotive applications which obviously account for a considerable percentage of the output of malleable iron foundries.

DIESEL LOCOMOTIVES

(Continued from page 37)

It has also been demonstrated that there are some railway lines where Diesels are not practical, at least at this time. Still another factor is that several railroad companies have made recent investments in more modern steam locomotives and it is questionable that they will write them off in the next few years.

Regardless of all of these factors which could possibly slow up the Dieselization program, the rise in Diesel-electric power is expected to continue since there are still many steam locomotives that should be and probably will be replaced for economy of operation.

Thus in this past decade, in addition to effecting economies that have helped to put the railroads in the black, the Diesel-electric has brought about mass production and standardization of locomotives, new production methods, new railroad maintenance methods, and new parts and service setups that are automotive in type. New markets have been opened for the makers of production and maintenance tools, and for the suppliers of Diesel engine parts. The Diesel-electric has set itself up as a part of the great automotive industries.

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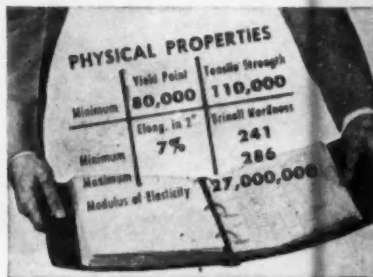
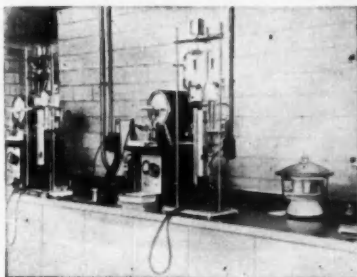
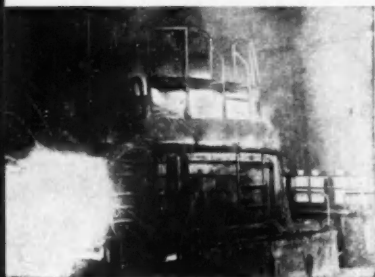
from the standpoint of

Quality Control

...high speed engine design and
production economy

Automotive engineers may not be fully aware of the steadily advancing progress that has been made during the past 15 years in the development of Cast Alloy Steel Crankshafts. To supplement their information on this subject, this, and succeeding Progress Reports will present technical information on the development work that has been done by Auto Specialties Mfg. Co. on Cast Alloy Steel Crankshafts, their growing acceptance, and the accumulating evidence of their unique advantages for mass-produced motor car engines.

Progress report No.1 on the Application of Mass-produced Cast Alloy Steel Crankshafts to the solution of some of today's Engine Production Problems.



AUSCO Quality Control It begins with the Specifications of the Formula A.S. 80 Metal, and continues in its Melting, with cold charge practice in Acid-lined Electric Furnaces of 15-ton capacity. Under critically observed chemical, temperature and slag conditions, the metal is teemed from bottom pour ladders, a whole heat at one time.

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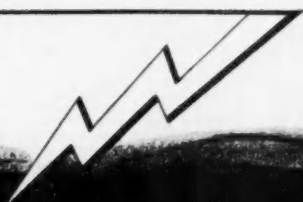
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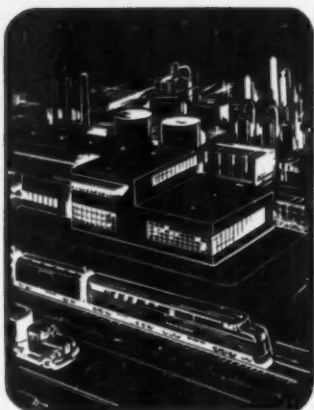
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Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

Despite slight declines in some indicators, general business activity early in September continued at a level substantially above that of a year ago. Decreases during this period were reported in department store sales, bituminous coal production, construction, railway freight loadings, and electric power production, while crude oil output rose to a new record level. For the week ended Sept. 2, the *New York Times* index of activity stands at 164.1 as compared with 162.4 in the preceding week and 140.5 a year ago.

The dollar value of department store sales in the week ended Sept. 9, as reported by the Federal Reserve Board, was equal to 235 per cent of the 1935-39 average, as compared with 210 in the week before. At this level, the value of sales was eight per cent more than in the comparable week of last year. The total reported since the beginning of the year was four per cent more than the corresponding sum in 1949.

Production of bituminous coal and lignite in the same period is estimated at 16,020,000 net tons, 1 million less than the output in the week before but 3,865,000 above the comparable amount last year.

Civil engineering construction volume reported for the five-day week ended Sept. 14, according to *Engineering News-Record*, was \$219.7 million, slightly less than the \$256.1 million of the week preceding, but 41 per cent above that of the similar period of 1949. The total recorded since the beginning of the year, at \$8.5 billion, is 46 per cent more than that in the corresponding period of 1949.

Railway freight loadings during the week ended Sept. 9 totaled 751,276 cars, 11.9 per cent less than the figure for the week before but 20.4 per cent more than the comparable number recorded a year ago.

Electric power production declined slightly during the same period. At 6929 million kilowatt-hours, total output was 14.7 per cent above the amount a year earlier, as compared with an advance of 16.5 per cent shown in the preceding week.

Crude oil output in the week ended Aug. 27 averaged 5,908,830 barrels daily, 149,200 more than in the preceding week and 1,005,380 above the production in the comparable period of 1949.

The wholesale price index of the Bureau of Labor Statistics during the week ended Sept. 5, at 167.5 per cent of the 1926 average, was 0.2 per cent higher than in the preceding week and 5.3 per cent above the corresponding figure for last year.

Member-bank reserve balances rose \$254 million during the week ended Sept. 13. Underlying changes thus reflected include increases of \$227 million in Reserve-bank credit and \$137 million in Treasury deposits with Reserve banks and decreases of \$108 million in money in circulation and \$51 million in non-member deposits and other Federal Reserve accounts. Small declines were also reported in Treasury cash and in the monetary gold stock.

Total loans and investments of reporting member banks decreased by \$114 million during the week ended Sept. 6. An increase of \$193 million in commercial, industrial, and agricultural loans was recorded. Total business loans, at \$14,932 million, were \$1955 million more than the comparable sum a year ago.

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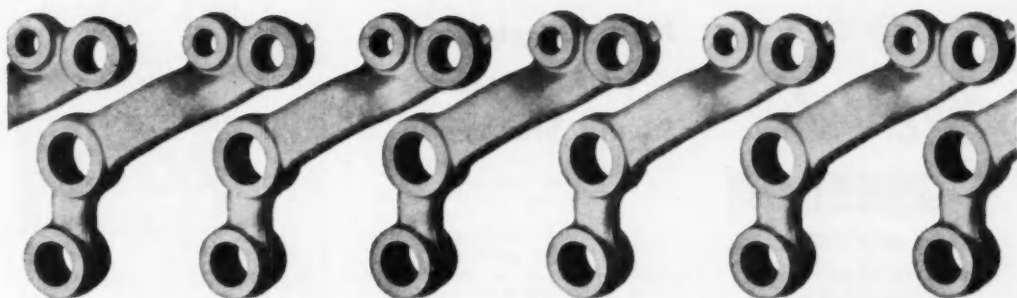


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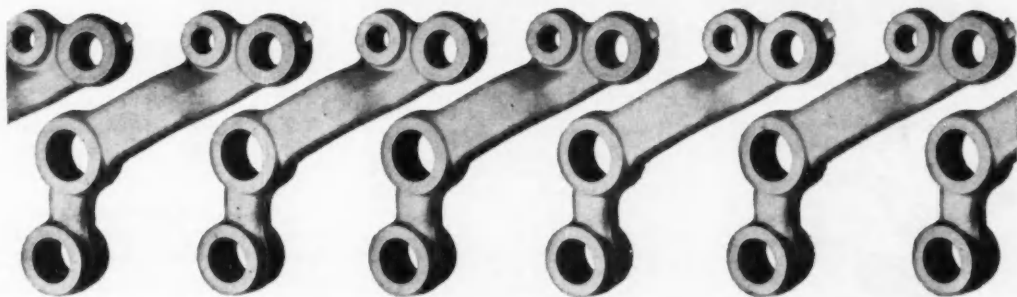


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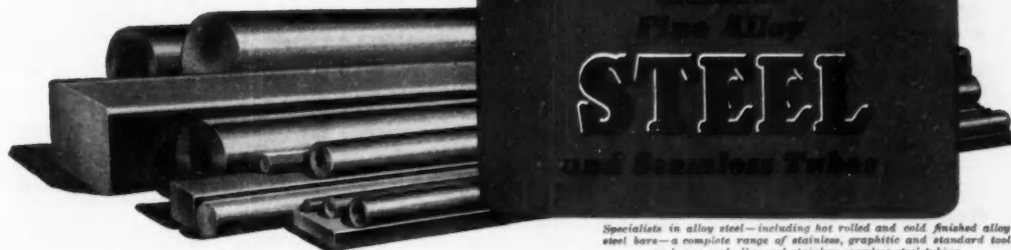
THE uniform forgeability of Timken® forging steels, plus their superior surface and internal quality, gives you better finished forgings at lower cost.

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For help with your problems, get an on-the-job analysis by our Technical Staff. No obligation. Also write on your letterhead for our authoritative, 112-page book, "Evaluating the Forgeability of Steels". The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

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Nash Improvements In Ambassador and Statesman

(Continued from page 41)

the Statesman to improve ventilation at normal driving speeds.

The radiator core on the Statesman is 2 in. narrower and more efficient. It has 10 cooling fins per vertical in., instead of eight.

Hydra-Matic for the Statesman is basically the same unit as for the Ambassador but contains some modifications. For one thing, fewer clutch plates are used in the rear planetary unit, to assure smooth shifts. On Hydra-Matic Ambassador and Statesman cars, the propeller shaft now is of one-piece type, eliminating the center bearing formerly employed.

For easier parking the steering ratio in both Statesman and Ambassador models has been increased. Overall ratio is 20 to 1 instead of the former ratio of 18.2 to 1.

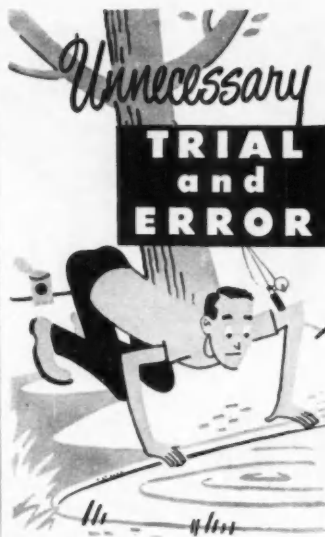
Steering knuckle support lower pins have been changed to enclosed threaded type on the Ambassador and Statesman. This is said to provide a gain in steering ease.

Improved riding comfort has been effected by the introduction of shock absorbers featuring the new principle of "two-stage" valving which is equally effective in hot or cold weather and under adverse road conditions. Ramblers are fitted with a new shock absorber of 7/8-in. diameter instead of the 1-in. size used at the start of production. However, the 1-in. size is available for export use.

The Ambassador muffler now is an oval two-pass type, giving better silencing than the straight-through type used formerly.

The exclusive Nash feature of full length twin convertible beds as standard equipment in all two-door sedans, club coupes and all custom models is retained for 1951. The Nash convertible bed also can be obtained in four-door sedans of the lower price super series as optional equipment.

Improvements have been made in the Nash "Weather Eye" automatic heating, ventilating and defrosting mechanism, resulting in greater air circulation to the passenger compartment. Fresh air is scooped in through a large intake on the cowl, passes through a dust trapping filter and is then heated or allowed to enter the car unheated for draftless ventilation. The system employs three blowers, two for defrosting and one for air circulation when the car is standing or is moving slowly. Automatic temperature controls are somewhat similar to those used to regulate heating in homes.



WHEN you're fishing, it's only by trial and error that you find what shadow that 3-pounder is hiding under.

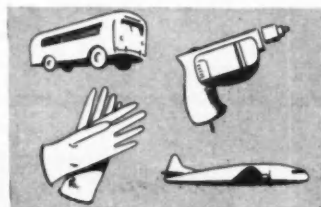
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To meet exacting automotive requirements, STALWART can fabricate custom rubber parts to S.A.E. specifications from compounds that . . . withstand extreme temperatures . . . have very low compression set . . . resist weathering, chemicals, oils, gasoline . . . flex or stretch continually with minimum permanent set . . . are developed for specific applications.

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The Henry J

(Continued from page 33)

Radiators are of fin and tube type with 9-qt cooling system capacity for the Six; and 10.8 qt capacity on the Four.

The chassis frame is of a box-type construction. The transmission is of conventional three-speed synchromesh type, supplied by Warner Gear. A Warner overdrive is available as optional equipment. The rear axle, supplied by Spicer, is of semi-floating type with standard gear ratio of 4.10 to 1; and 4.55 to 1 on cars equipped with overdrive.

Front suspension is of conventional type with coil springs and two-way direct acting shock absorbers mounted within the coil spring. As illustrated, suspension arms have a pronounced sweep-back. A sway bar of torsion type is mounted at the front. The rear suspension consists of five-leaf, semi-elliptic springs with protective covers. Direct-acting shock absorbers at the rear are mounted in sea-legs fashion from the cross member ahead of the rear axle.

Gemmer steering gear of worm and roller tooth type is used. Brakes are four-wheel Bendix hydraulic type with 132 sq in. of lining area. Low pressure, 5.90-15 tires are standard.

Comfortable passenger seating is assured by provision of 56 in. elbow room in the front seat, 54½ in. in the rear.

BOOKS . . .

HANDBOOK OF EXPERIMENTAL STRESS ANALYSIS, by M. Hetenyi, published by John Wiley & Sons. Experimental stress analysis is a formal philosophy of fairly recent origin making possible the determination by experimental methods of the stress distribution in actual operation on production parts without knowing the nature of the forces at work. A considerable literature has been developed in recent years and this text marks the first time that the ramifications of this broad subject have been organized into handbook form for ready reference. It is organized in 18 chapters, supplemented by an Appendix containing three major reports—The Theory of Elasticity; Dimensional Analysis; and Precision of Measurement. The handbook is unquestionably of interest to designers, research engineers, and other technical people in the automotive industries.

DATA ON CORROSION- AND HEAT-RESISTANT STEELS AND ALLOYS—WROUGHT AND CAST. Special Technical Publication No. 52-A.—These new tables of data on the compositions and properties of the wrought corrosion-resistant and heat-resistant chromium and chromium-nickel steels and alloy castings brings up-to-date a previous compilation on wrought stainless alloys. Included is a comprehensive new section devoted to cast alloys. The data for the different steels have been condensed to the simplest form to provide a ready reference for both maker and user of the steels. Copies of this 84-page publication, heavy paper cover, can be procured from the American Society for Testing Materials, 1916 Race St., Phila. 3, Pa., at \$2.50 each.



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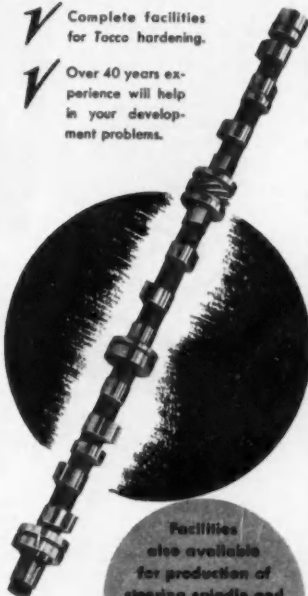
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✓ Rigid adherence to specifications
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NEW PRODUCTION AND PLANT EQUIPMENT

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use coupon on page 62

(Continued from page 58)
traverse reverse. Feed range by change gears is the same as the standard machine, from 0.002 in. to 0.083 in.

The second arrangement combines the use of a reversing motor with a new

feed and threading transmission incorporating two additional planetary shafts so that a wider range of threads may be cut, either right or left hand.

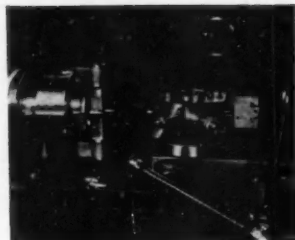
Leads of 0.1666 in. to 0.0132 in. (6 to 32 pitch) for left-hand threads are available, and the right-hand range is from 0.143 in. to 0.0312 in. (7 to 32 pitch), obtained by change gears. Eighteen feeds are also provided.

M-49—Indexing Chuck for Electro-Cycle Machines

A 10-in. two-jaw air-operated indexing chuck for electro-cycle machines,

produced by Warner & Swasey, Cleveland, Ohio, is said to effect as much as a 50 per cent reduction in machine and work handling time through the cycle.

Actuated by a floor-type air valve, the chuck jaws index on an axis parallel with the chuck face through each of four 90-deg positions, while the spindle is turning, and at a rate of speed which is hardly measurable.



Warner & Swasey indexing chuck for Electro-Cycle lathes

This means that individual cutting operations performed at successive faces of a hexagon turret may be completed at one setting of the turret on all four limbs of a pipe cross, for example, radically reducing the number of times the turret is indexed. It is likewise unnecessary to stop the chuck to index the workpiece.

The new indexing chucks are designed for use with Warner & Swasey Electro-Cycle lathes, further contributing to the reduction in machine-handling time effected by the E-C electronic program control system.

The indexing chuck design is based on a standard air chuck body and closing mechanism, using special master jaws which index through air power drawn from the machine's stationary air cylinder.

Publications Available

(Continued from page 62)

trates the company's horizontal and vertical plano surface grinders. The center spread in the booklet (consisting of four pages) shows large drawings of the plano grinders and gives information on construction details. A page of specifications for both type grinders is included.

L-86 Oil Hydraulic Control Devices

Hydraulic Equipment Co.—Delivery data on pumps, capacity ranges on valves, operating pressures and other data are given in a new folder on Hydrex gear pumps, control valves, auxiliary valves, cylinder assemblies, etc.



WHY Vulcan Rubber Coated Fabrics MAKE SUPERIOR Fuel Pump Diaphragms

There's an important new trend to VULCAN RUBBER COATED FABRICS for fuel pumps, vacuum booster pumps and other automotive parts actuated by diaphragms.

Leading manufacturers are switching from older materials to VULCAN rubber coated fabrics, having found by test that VULCAN products meet the most exacting operating requirements. One manufacturer recently

chose VULCAN fabrics over 20 other materials tested.

VULCAN fabrics resist oil, gasoline, alcohols, butane, propane, aromatics, solvents and acids commonly encountered in automotive operation.

If your product uses diaphragms, it will pay you to investigate the new, improved VULCAN rubber coated diaphragm fabrics.

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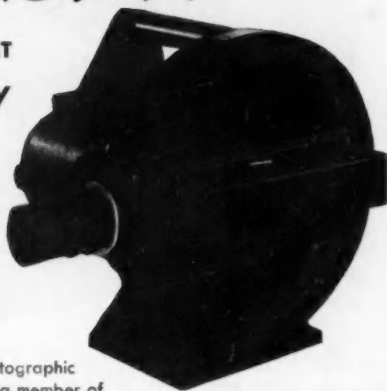
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2 GREAT NAMES JOIN HANDS.....

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FASTAX



**Edward A. Springer, PRESIDENT
Wollensak Optical Company
Announces Purchase of
Fastax High Speed Camera**



Wollensak Optical Company has purchased outright from Western Electric Company the Fastax High Speed Motion Picture Camera, together with all rights for exclusive manufacture and distribution. By acquiring the Fastax, Wollensak will be able to render an immeasurable service to many industries and scientific laboratories.

The Fastax Cameras, part of our new Industrial and Technical Photographic Division, will be headed by John H. Waddell, for twenty-one years a member of the Technical Staff of Bell Telephone Laboratories. Under his guidance the Fastax was perfected. Mr. Waddell has also been photographic consultant to both the Army and Navy, and was a consultant to the Army Air Force on the Bikini Experiments. He will personally attend to all inquiries regarding the Fastax and to all problems of high speed photography.

E. A. Springer

**ACQUISITION OF
FASTAX HIGH SPEED CAMERAS
ANOTHER EXAMPLE
OF WOLLENSAK
LEADERSHIP
IN THE
PHOTOGRAPHIC
FIELD**

Wollensak
MEANS FINE LENSES
OPTICAL CO., ROCHESTER 21, N. Y.

The Fastax, a continuous moving film type camera, is rated not only as the highest speed commercial camera of its type made, but also the most versatile device for recording high speed motion, of either a repetitious or transient nature. Produced in three sizes—to accommodate 8mm, 16mm and 35mm film—it takes motion pictures at a speed of 150 to 10,000 frames a second with an exposure time of 1/50,000 of a second. The purpose of the Fastax is to make available to engineers and scientists a tool for the close study of high speed phenomena now beyond the perception of the human eye.

Wollensak is proud to have Fastax in its line of products . . . particularly since the camera's inception it has been equipped with Wollensak optics.

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Versatility!

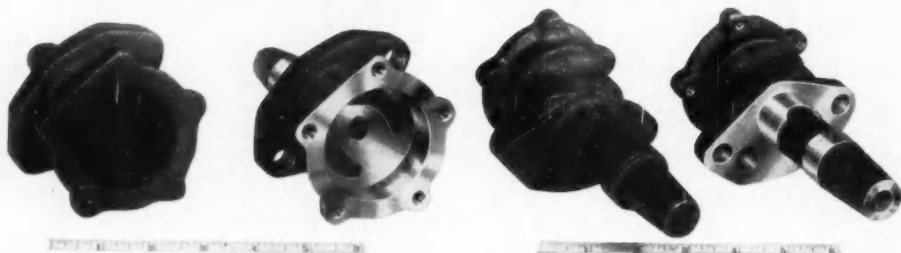
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- ★ **DRILL** and
- ★ **TAP**

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1st OPERATION—Face flange, finish counter-bore 1 D and depth, cut groove in flange, drill and tap 5-29/64" holes.

308 pieces per hour, gross. Work is held stationary during drilling and tapping operations.

2nd OPERATION—Face and turn shank end, under cut spot drill and then drill center hole through to cored section, turn O D of shank, ream center hole, drill 2-15/32" holes.

222 pieces per hour, gross.

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The BAIRD MACHINE COMPANY, Stratford, Conn.

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MACHINES • AUTOMATIC PRESSES • TUNNELING BARRELS, ETC.

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Now "Caterpillar" offers the heavy construction contractor two new "equipment packages" — the DW20 Tractor and W20 Wagon for earth moving, and the 2-wheel Diesel prime mover "Cat" DW21 with the No. 21 Scraper—rugged, large-capacity earth-movers for off-the-road work.

The Federal-Mogul sleeve bearings and bushings used in these models are designed and manufactured to complement the famous heavy-duty dependability built into all "Caterpillar" units.



FEDERAL-MOGUL CORPORATION, 11037 Shoemaker, Detroit 13, Michigan

*"Caterpillar" DW20
Tractor and W20
Wagon at work on a
heavy earth-moving job.*





They told him Stainless Steel would outlast the car

If you were to make a test of it, Allegheny Metal trim and fasteners actually *would* stay on the job, perennially bright and strong, until the rest of the car crumbled into dust. But the main point is that the use of stainless steel adds little or nothing to the cost of the car, yet vastly improves its appearance, value and easy cleaning qualities during all of the vehicle's useful life.

What's more, nothing else can do the job as well. No other metal now commercially available is as strong, as corrosion and heat-resistant and as hard-surfaced—taking all these virtues together—as stainless steel. That's why Allegheny Metal gets the call for so many uses in transportation equipment, aircraft and other essential industries where lasting, dependable service is required under really tough conditions. When the chips are down, as at present, stainless steel is

vital to the national interest.

We're continuing to spend many millions of dollars to add more production of Allegheny Metal and other alloy products to the great increases we've already made. We're ready, too, to assist fabricators in finding better ways of using stainless steel, to make the supply go as far as possible. *Call us in to work with you.*

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Complete technical and fabricating data—engineering help, too—are yours for the asking from Allegheny Ludlum Steel Corporation, Pittsburgh, Pa. . . the nation's leading producer of stainless steel in all forms. Branch Offices are located in principal cities, coast to coast, and Warehouse Stocks of Allegheny Metal are carried by all Ryerson Warehouses.

WAD 3269

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70% MORE STROKES

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CHALLENGE TO INCREASING COSTS

Here is a new and successful press to speed up production (up to 70% more strokes per minute) over conventional mechanical presses . . . enables you to use low cost non-premium metals for deep drawing . . . cuts scrap loss to the bone! Yes, H-P-M Twin-Power is a mechanical press . . . but a vastly different type of mechanical press. By employing hydraulics for:—rapid advance of slide to the work . . . for controlling pressures . . . for protection against overload . . . it wipes out the shortcomings of the conventional mechanical press. Think of the tremendous production possibilities opened to you with versatile, economical Twin-Power. Call in a nearby H-P-M Engineer to go over it with you in detail . . . to show you where it can serve you most effectively.

THE HYDRAULIC PRESS MFG. COMPANY
3012 Marion Road
Mount Gilead, Ohio, U. S. A.

HERE'S WHAT H-P-M TWIN POWER WILL DO

- Up to 70% more strokes per minute with no increase in draw speed.
- Up to 45% reduction in draw speed with conventional number of mechanical press strokes per minute.
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- Full pressure for first 1/2 inch below mid-point of slide stroke.
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- Positive overload protection—through predetermined pressure adjustment.
- Known adjustable pressures—through hydraulics.



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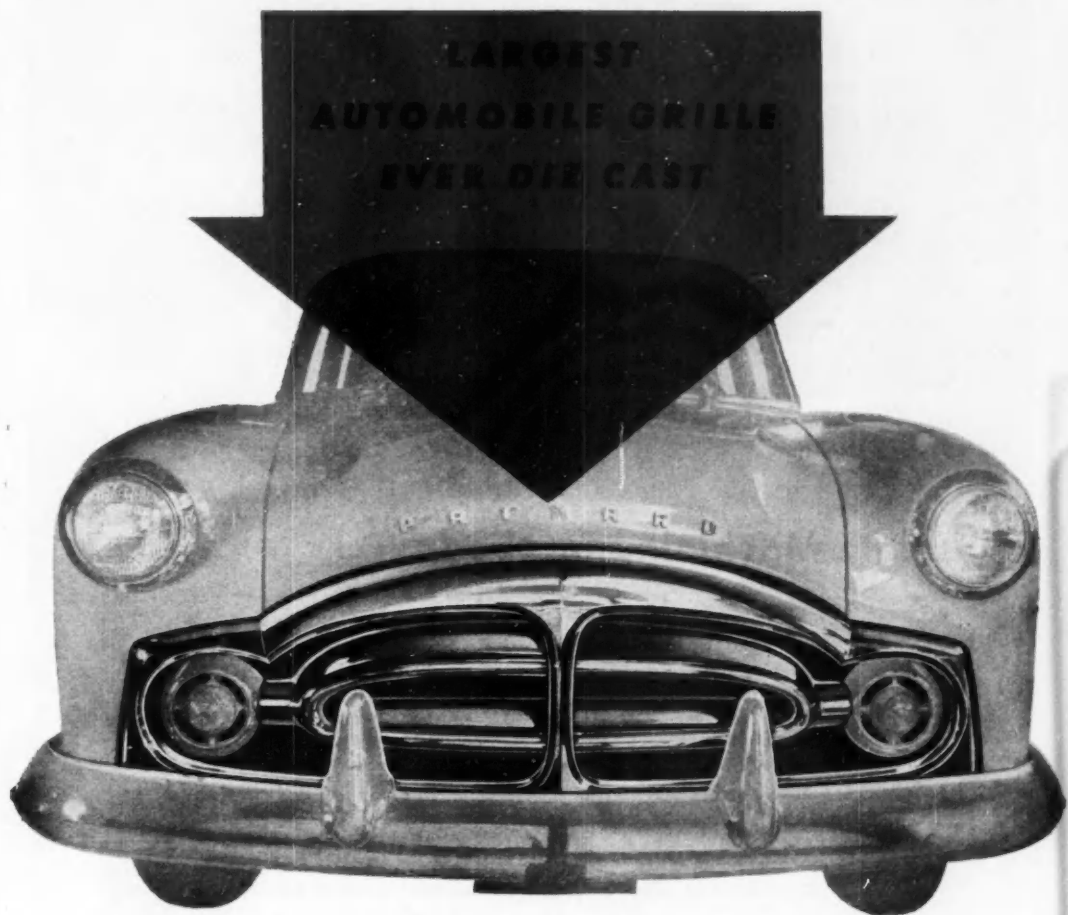
As specialists in the design and manufacture of heat transfer products, Harrison engineers and production men were called in on the automatic transmission. And for each application an oil cooler was designed to meet the specific requirements of the car manufacturer.

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This achievement supports our long-standing conviction:

There is no limit within reason

New die-cast applications ahead, large or small, are as limitless as the designer dares to imagine. Our engineering and research departments welcome the opportunity to make your imagination a reality. A phone call to our plant located nearest to you will bring immediate response.

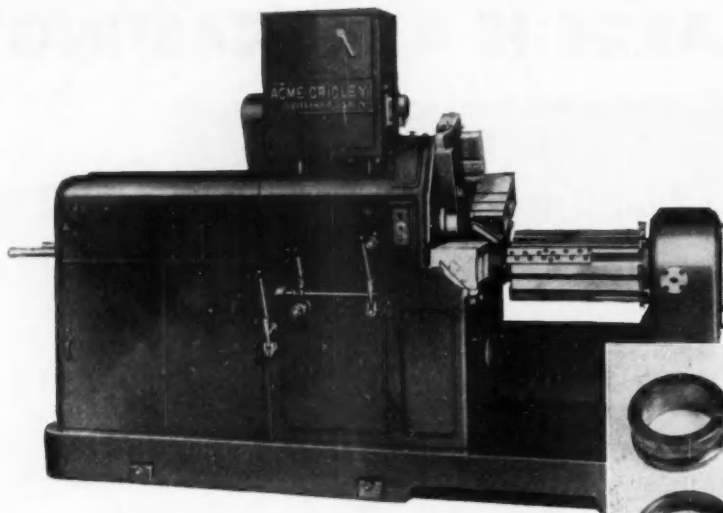


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Here's Your Answer to Obsolete Machining Methods

For this class of work...



For gear blanks, bearing races, collet parts and the like, the new National Acme Model M Single Spindle Automatic will out-produce older methods as much as ten to one.

Check these features and you'll see why the Model M gives you "more good pieces in the pan":

- **Eight Independently Operated Tool Slides**—permit use of speeds and feeds best suited to each cut, using carbide or high speed cutting tools.
- **Three Ranges of Automatic Spindle Speeds**—provide correct surface speed for a wide range of diameters.
- **Easily Accessible Camming**—minimizes change time on small lot setups.
- **Turret Indexes Independently**—several short end operations can be performed while heavy forming cuts are being made from the side slides.
- **Rugged, Open Frame**—strength to take full advantage of carbide tools, yet plenty of room for chip clearance and easy tool adjustment.

The Model M is a completely new, fully automatic machine, available in four capacities—from 2-5/8" to 5-1/2". For ease of operation, for speed, stamina and economy, this new National Acme is your best bet to beat obsolescence in your shop. May we show you production estimates on your jobs?

Machine obsolescence is the creeping paralysis that strangles profit.



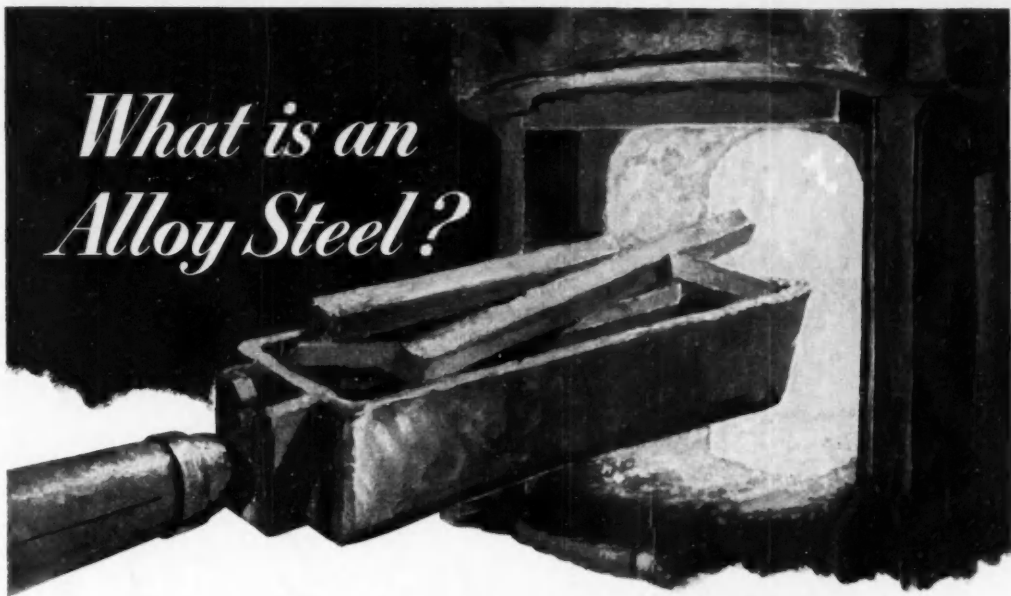
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What is an Alloy Steel?



In general, an alloy steel is a grade in which one or more alloying elements have been added to impart special properties and thereby increase the value of the steel for given uses.

More specifically, an alloy steel is defined as one in which the maximum specified content of alloying elements exceeds one or more of the following limits: manganese 1.65 pct; silicon 0.60 pct; copper 0.60 pct — or, one in which there is a range or minimum quantity, within the limits of the recognized commercial field of: aluminum, boron, chromium, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium, or any other element that has been added to produce a desired alloying effect.



WHEN DOES IT PAY TO USE ALLOY STEELS?

Generally, it pays to use an alloy steel when a higher degree of strength, ductility and toughness is required than can be obtained by the use of carbon steel in the section under consideration. Alloy steel should also be employed where such additional properties as resistance to corrosion, resistance to heat, and desirable low-temperature impact values are required.

With carbon steel, good mechanical properties can only be developed near the surface by proper heat-treatment. Uniform properties throughout the piece are possible only when the section of steel is relatively small.

In some instances it may require considerable study to determine when and how to use a particular alloy steel to advantage in a given product. When this is the case, our metallurgists will be glad to give impartial advice on analysis, heat-treatment, machinability and expected results.

We manufacture the entire range of AISI grades and special-analysis steels as well as carbon steels.

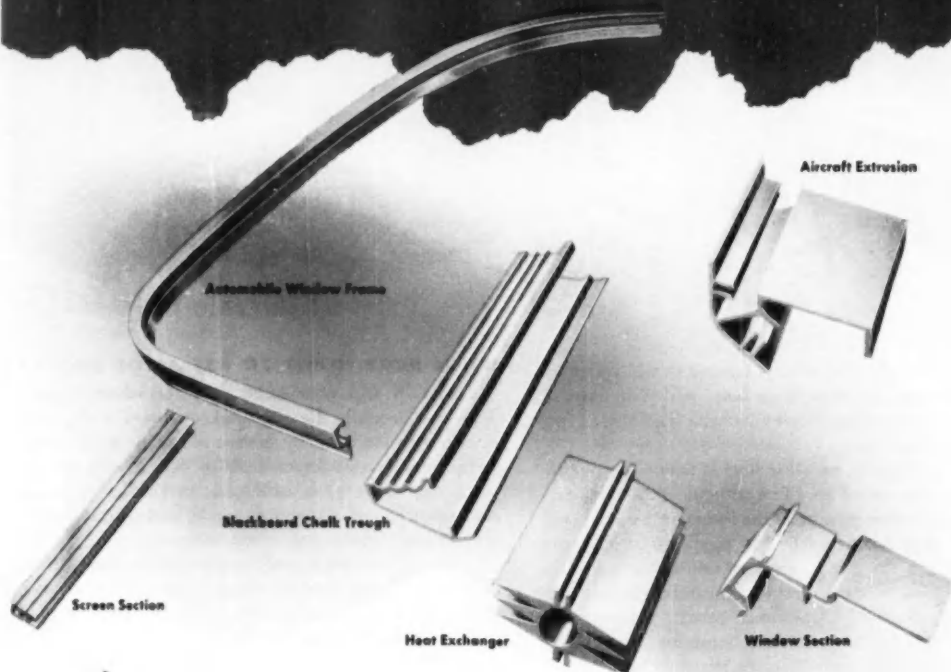
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Versatility of the extrusion process has revolutionized the fabrication and production of metal parts.

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Strength, design lines, surface finish, corrosion resistance are BUILT-IN to aluminum extrusions.

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A REVELATION in hand hoist performance **YALE LOAD KING**

***EASY to
move around***

***FAST in
lifting action***

***SAVES back-
breaking work***

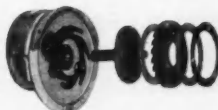
Portable. ½-ton model weighs only 37 lbs. High strength aluminum alloy castings and alloy steels, fewer parts—all are combined to provide the compact "carry-around" lightness of the Load King in all capacities.

Up to 95% efficiency! It takes this hoist a mere 20 seconds to lift 1,000 lbs. 3 feet. Only 60 seconds to hoist 4,000 lbs. 2.1 feet. All rotating shafts are ball bearing equipped, parts are precision machined, and the powerful, revolutionary new Synchro-matic load brake acts quick as a wink.

Hand pull force necessary to lift the load is maintained at minimum by the high efficiency of this hoist. ½-ton or 2-ton capacity—the Load King is a one-man hoist. Easy lifting keeps operators "in trim" all day. Production hikes, costs go down.

NO OTHER HOIST HAS THIS SYNCHRO-MATIC LOAD BRAKE

Employs a new, improved principle of instantaneous brake action—maximum braking power, automatically! 6-tooth pawl engages 24-tooth ratchet at 6 points simultaneously with balanced and cushioned spring pressure . . . no side pressure on bearing surfaces . . . longer pawl life. Stabilizer ring gives a soft, even, lighter hand chain pull—speeds brake release for precise inching when lowering.



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½, 1, 1½ and
2 Tons

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Investigate fully every feature that makes the Load King your best hand hoist investment. Get all the facts from your Yale distributor or mail the coupon to load headquarters. You'll be convinced! So act now!

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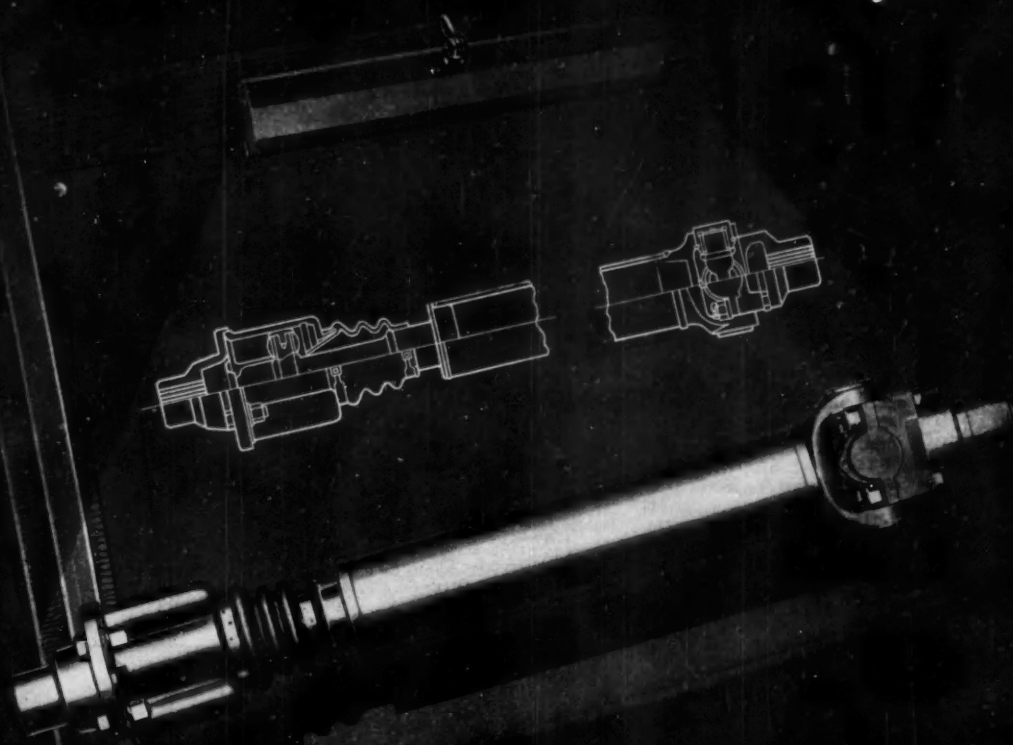
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See our full page "ad" in the STATISTICAL ISSUE p. 25

Only UNIVERSAL PRODUCTS Makes Ball and Trunnion Universal Joints



*... and only DETROIT Drive Shafts Incorporate
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The development of the DETROIT ball and trunnion universal joint has made possible extraordinary improvements in propeller shaft operation. Anti-friction slip motion, angular motion and length changes are accomplished without spline friction. Thus thrust load on transmission and axle bearings is minimized. Result: longer life for the entire drive train . . . and a better riding automobile.

*Two types are available—the ball and trunnion combined with the cross type universal joint, as illustrated above, or the ball and trunnion at both ends.

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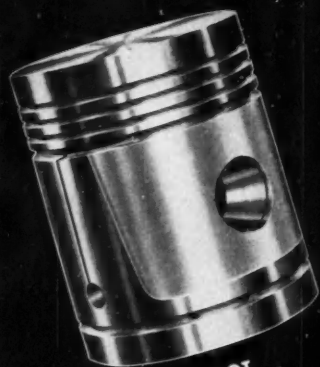
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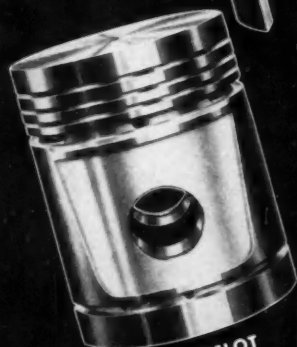
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